

Subject: LVDS tsmc process simulation

17001

File: D:\projects\lvds\Albert Chang\tsmc_ans.txt 2000/2/11, 02:50:43PM

Subject: [Fwd: Questions about 0.35um Logic SPICE model again]
Date: Fri, 11 Feb 2000 14:13:09 +0800
From: Chien-Jian Tseng <cj.tseng@trumpion.com.tw>
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Subject: Re: Questions about 0.35um Logic SPICE model again
Date: Fri, 11 Feb 2000 13:05:35 +0800
From: "CYTUNG" <cytung@tsmc.com.tw>
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Hi C.J.:

Sorry to answer your questions. I put my answers in your question list.

Sorry to bother you again. About how to use 0.35um Logic Silicide SPICE model correctly, I still have some questions as followed:

1. for poly & p+ diff. resistor value, the variance is within 6 sigma. Is it possible to control the variance within 3 sigma?
Ans: We can't use 3 sigma to our SPEC. It will increase our wafer scrap rate. But basically, our control can locate within 3 sigma. The

variance locates out 3 sigma, the chance is very low.

2. What's the current density for poly resistor? I mean what's the max. current that a 1um wide poly can afford? and for NW resistor? for p+diff. resistor?

Ans: We don't have this kind of data.

3. for p+NW diode model (PDIO). When I do the diode layout, are there any specific design rules related to these p+ diff. and NW?

Ans: There is no special rule on the Dio design except the process design rule. However, we recommend the diode layout should be in cubic style since that will get more accurate simulation results.

4. I notice that for 0.25um process, that's a "salicide" process instead of "silicide" process. I am not quite familiar with semiconductor process. Could you briefly explain what's the different between "salicide" and "silicide" process?

Ans: silicide means source/drain area used Ti silicide, but gate area used W silicide. We used two different steps to get them. -->0.35um

process salicide mean self-align silicide. It means source/drain/gate area

was

Ti silicide. We used one steps to get them. -->0.25um process

I appreciate your kindly help on those issues, and happy lunar new year.

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曾千傑

IC Design Engineer

創品電子

http://www.trumpion.com

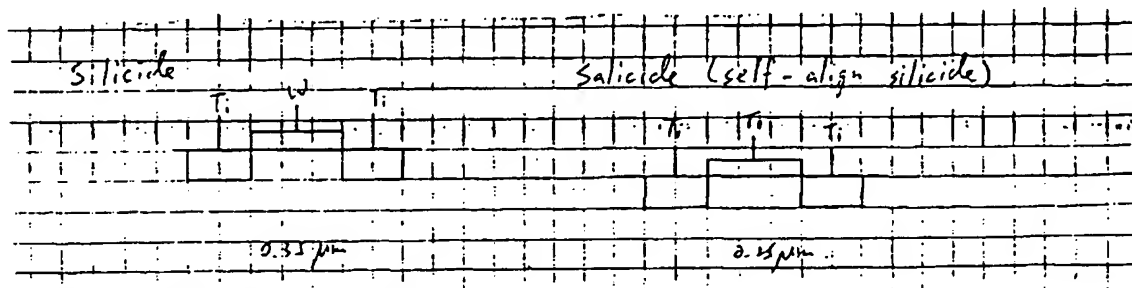
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Disclosed To And Understood By Me

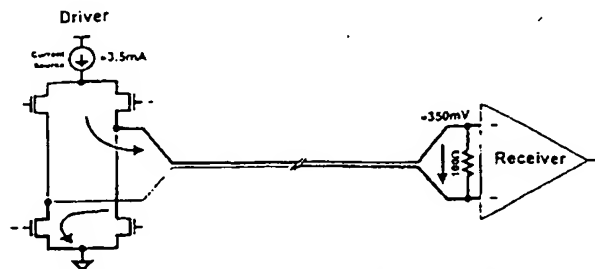
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Signature: blair
Date: 2000/2/11

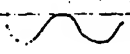
TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000463

17002
Subject: -VDS concept



Simplified diagram of LVDS driver and receiver connected via 100Ω controlled differential impedance media.

receiver  350mV peak to peak

line 1  line 2

closed To And Understood By Me

Name _____	Date _____
Name _____	Date _____

Signature: blair

Date: 2/2/12

Rsb cir — PLLr — CHPUMP

V=IZ

R10 KPLL — INV PLLa

INV PLLa

MOS Inverter

CM VCO3

Differential Inverter

VARN VARP → BIAS current current

可用所控制之電流決定速度

= 電流 MOS 控制電壓

CM VCO3 電壓 → 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-12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17004

PLL study

Analog PLL is $f_o - f_i \Rightarrow \text{voltage} \rightarrow \text{control VCO}$

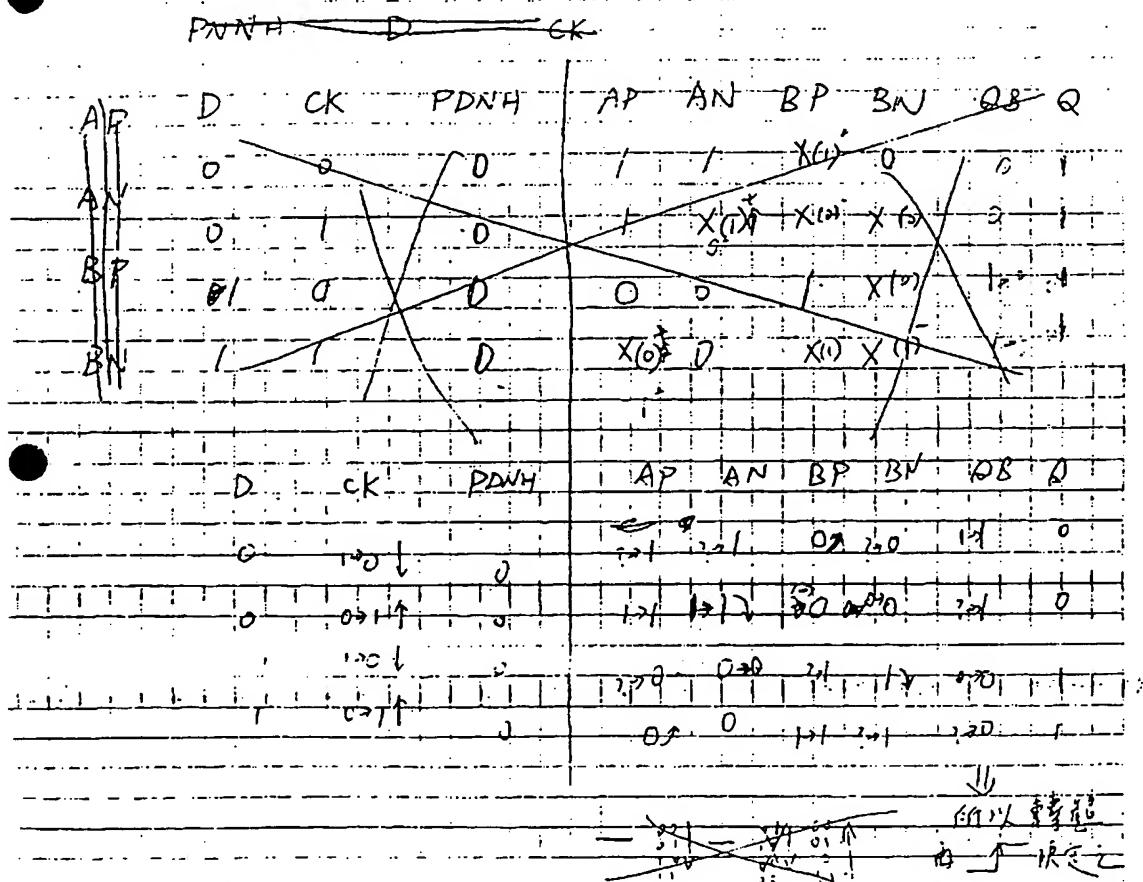
Necessary control voltage $\rightarrow V_c$

RD output $\rightarrow V_d$

$$(\theta_1 - \theta_2) = \theta_0 \neq$$

no input $\Rightarrow \theta_{d_0} \Rightarrow V_{d_0}$

ISPDFF



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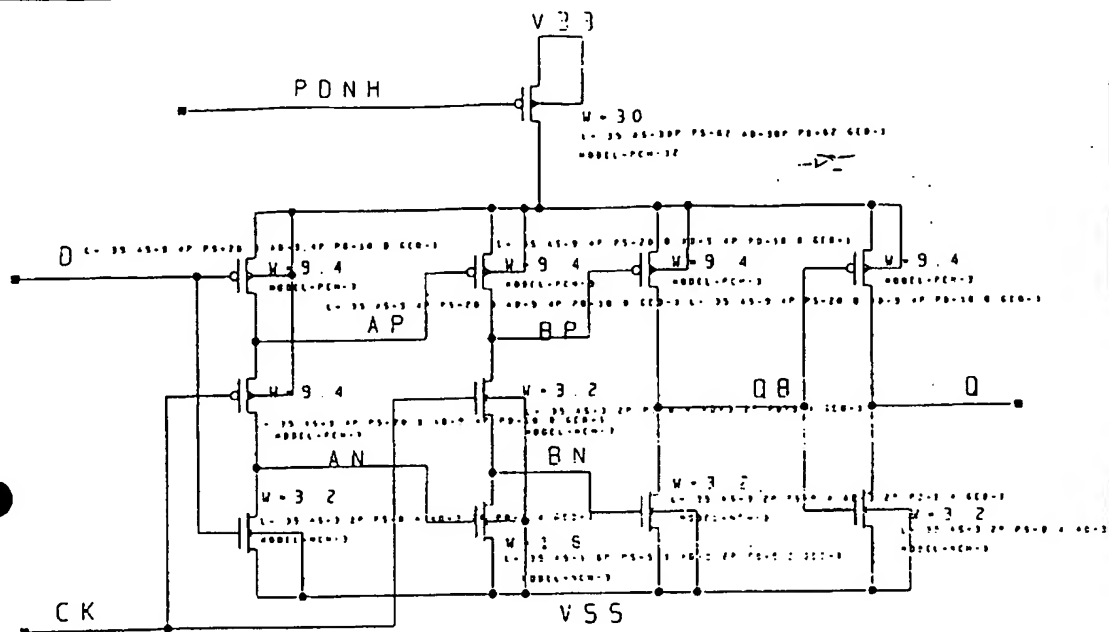
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Name
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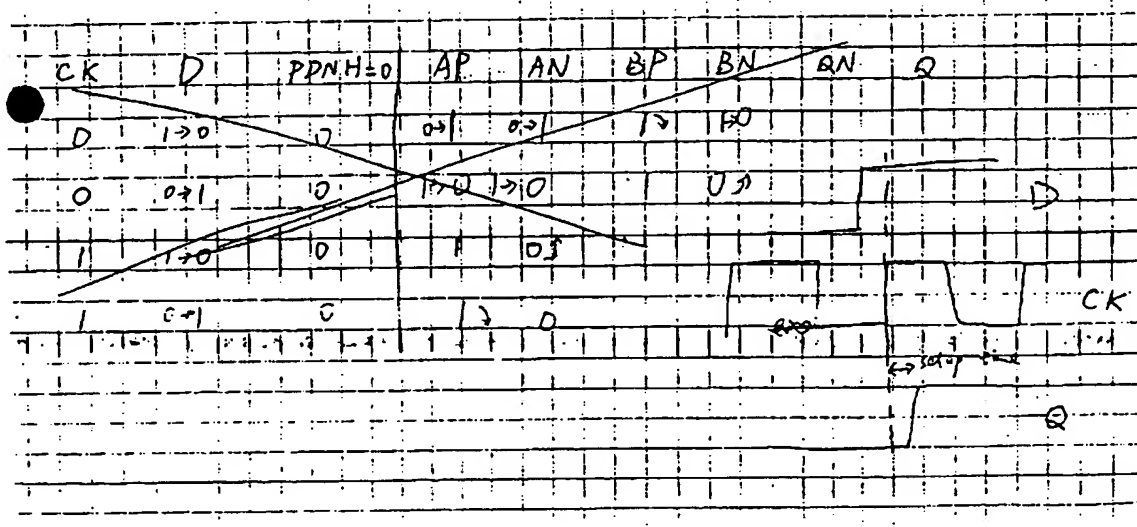
Date: 200/3/16

Subject: _____



TSPDF d

SQ

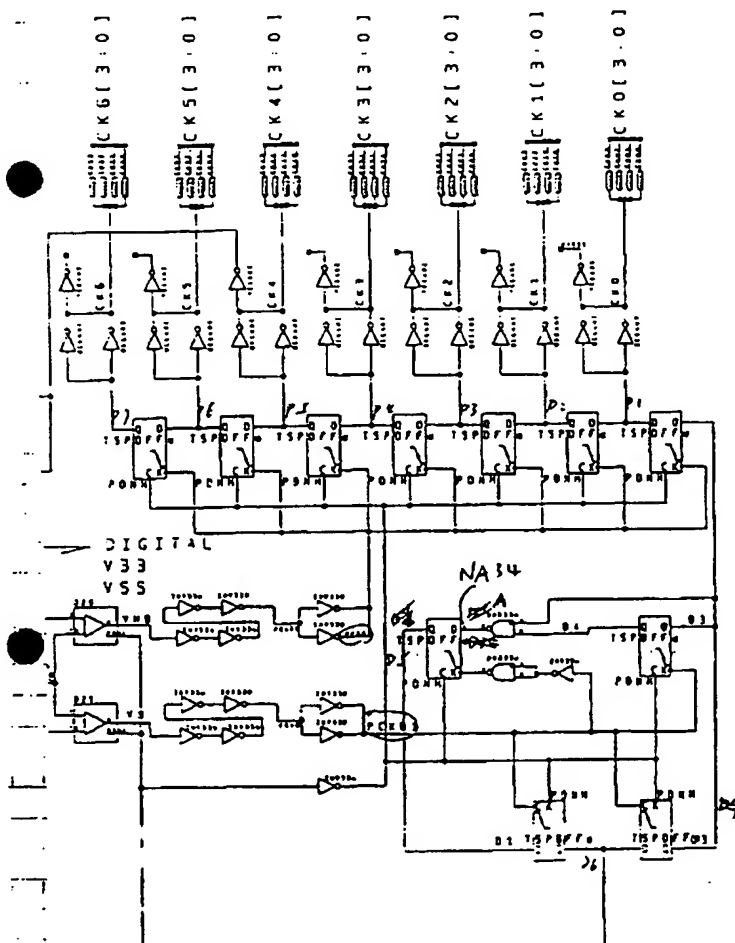
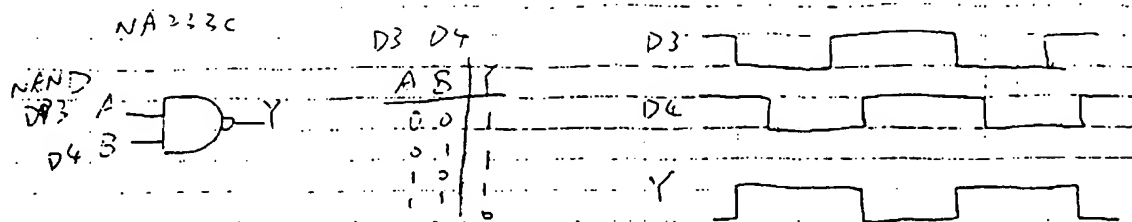
by Albert.Yi long Chang
Date: Aug.08.1999

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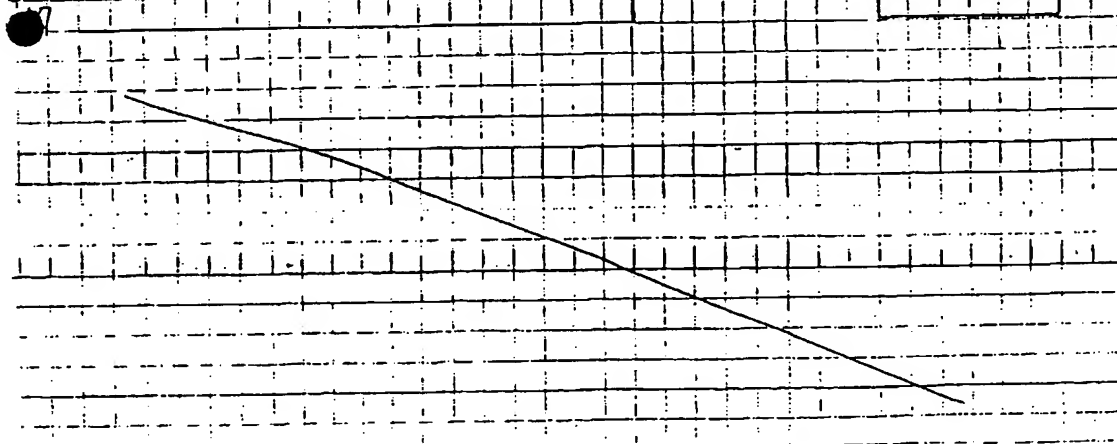
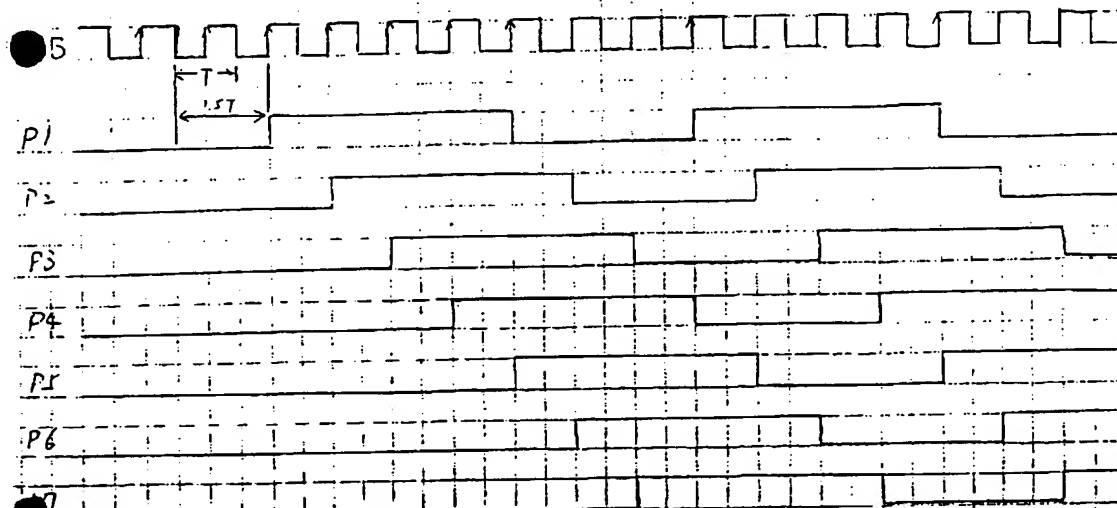
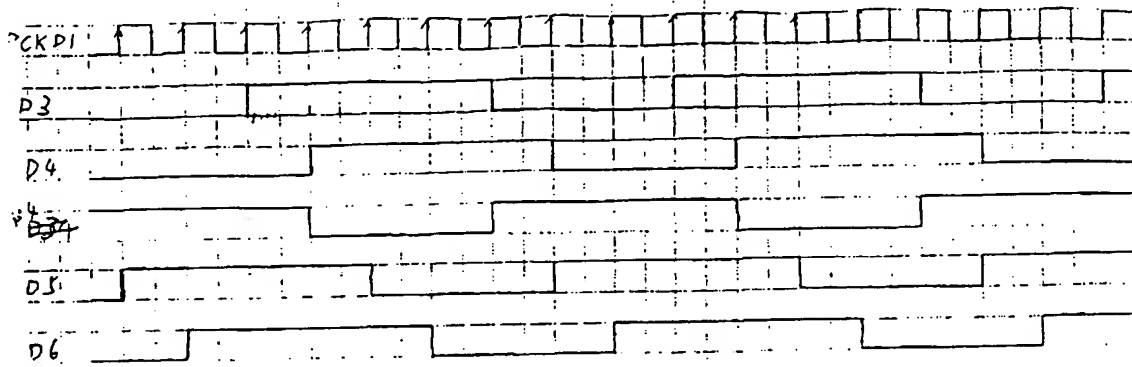
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Date: 2001/3/16

17006
Subject: PLL study - 7 phase loop



Subject: _____

Assume initial D3=0 D4=0 ~~D5=0~~ D5=0

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Name	Date

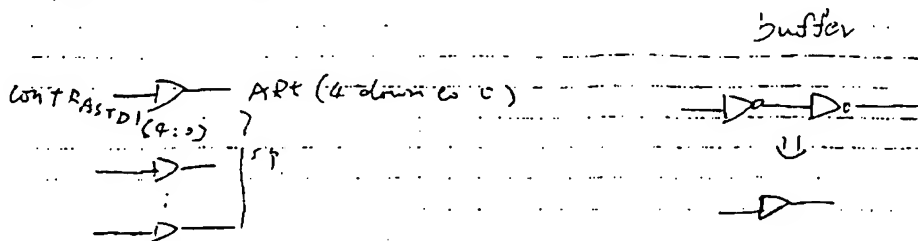
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Date: <u>2-2/3/22</u>

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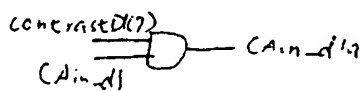
TR000469

11000
Subject: OS/0 VHDL code study

$ARE \leftarrow CONTRASTDI(4 \text{ down to } 0);$

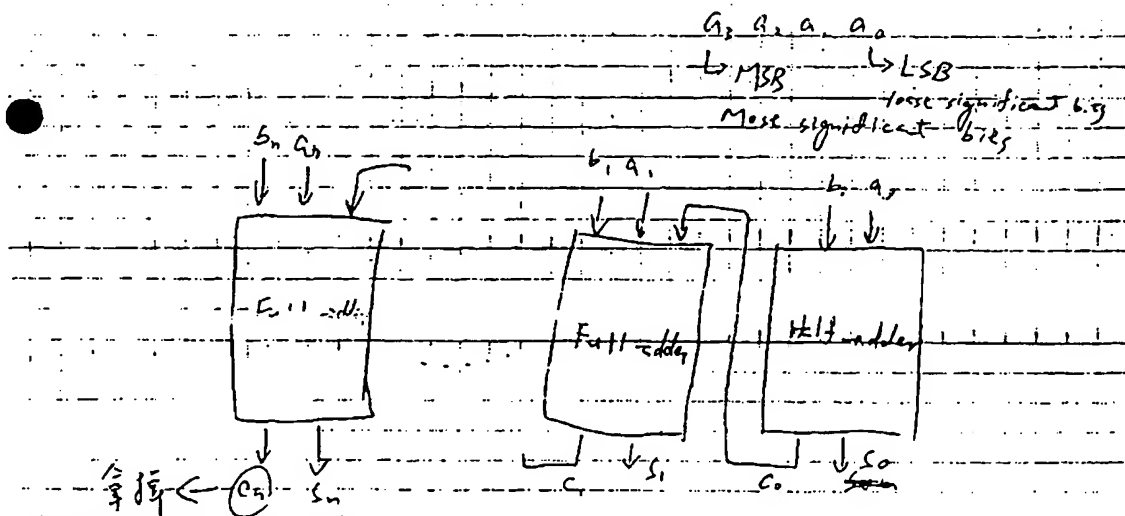


$CAin_d1a \leftarrow (\text{others} \Rightarrow '0') \text{ when } CONTRASTDI(7) = '0';$
 $\text{else } CAin_d1;$



$CAin_d2a \leftarrow CAin_d2 + Ain_d2$

$CAin_d3a \leftarrow CAin_d3 + Ain_d3$

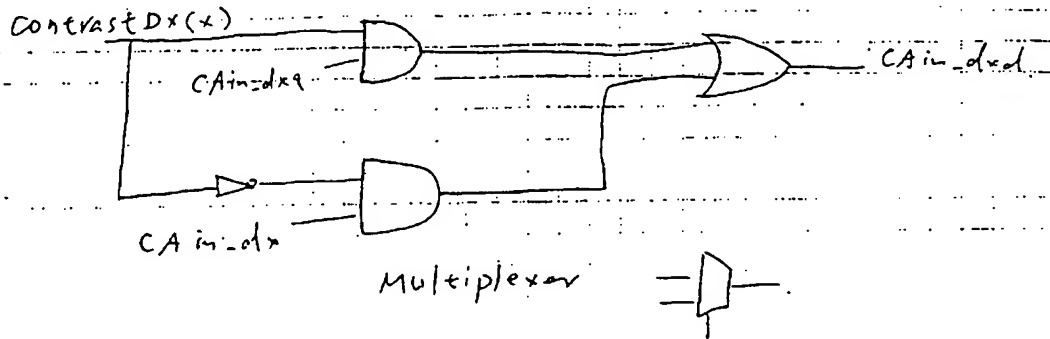


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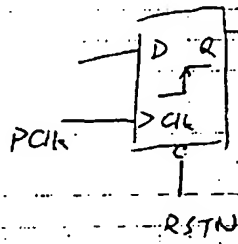
Signature: Blair
Date: 7/22/5/21

$CA_{in_dxd} \leftarrow CA_{in_dx} \text{ when } ContrastDx(x) = '1' \text{ else } CA_{in_dx}$



IF (PClk' event AND PClk = '1') THEN

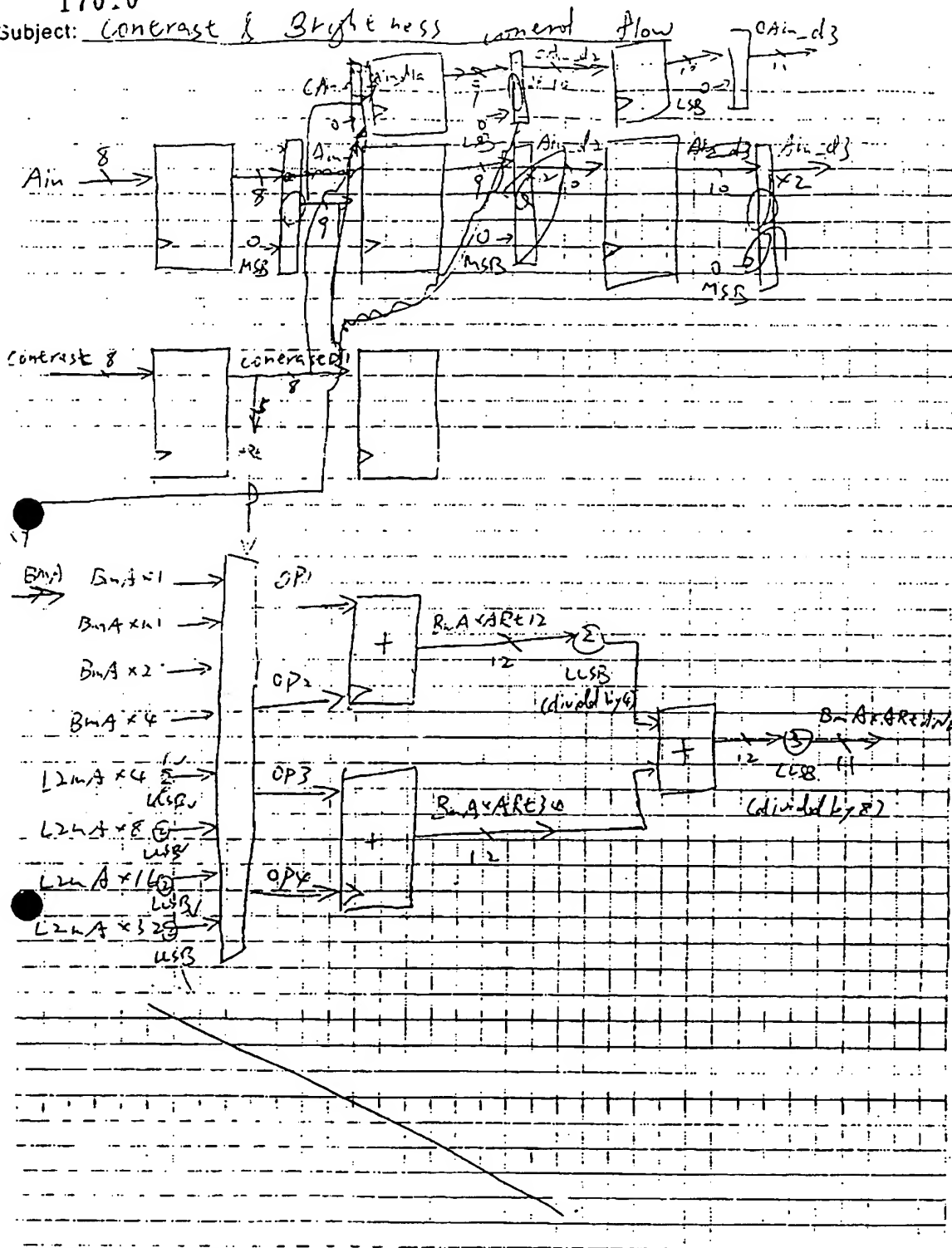
IF (RSTN = '0' or RSTN = 'L') THEN ELSE



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_____ Name	_____ Date	Date: <u>10/3/71</u>

17020
Subject: Contrast & Brightness control flow 7011-13



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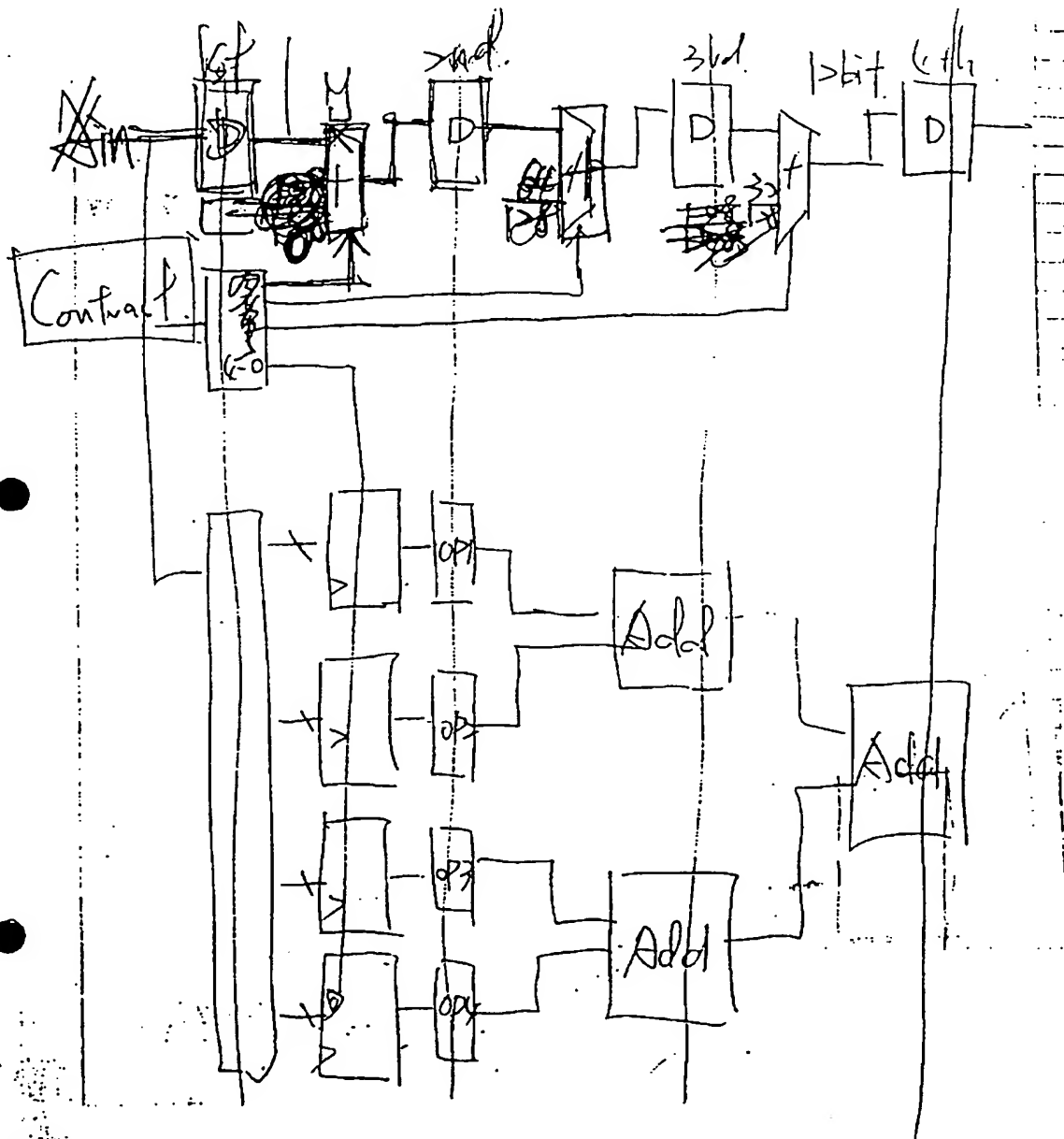
Name	Date
Name	Date

Signature: bleiv

Date: 2020/3/22

Subject: _____

17011



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Signature: L. L. L.
Date: 2000/13/12

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TR000473

Subject:

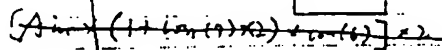


61, iv ✓

2023/3/22

$$A_{in} + [A_{in} \times \cos(7.6)] \times 2$$

$$A_m = \begin{bmatrix} 1 & 2 \cos(6) & 4 - \cos(6) \cos(7) \\ 0 & \dots & \dots \\ \dots & \dots & \dots \end{bmatrix}$$



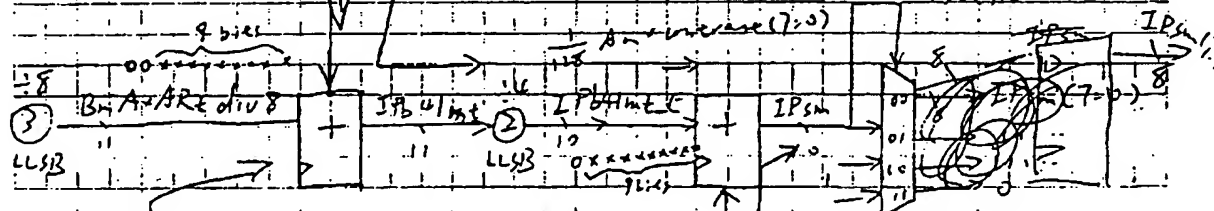
$$A \ln x \ln(7) + 2 + A \ln \ln(6)$$

$$= [A_{in} + \text{contrast}(-7.6)] \times 2$$

Air + concrete (6.5) Air + concrete (7.6.5) • 100 or

$$= \frac{1}{3} (A_{11} - \frac{1}{11} \cdot 2) + \frac{1}{3} (A_{22} - \frac{1}{11} \cdot 2) + \frac{1}{3} (A_{33} - \frac{1}{11} \cdot 2)$$

$$O'NUL = SP_{UL} (9:8)$$



$$\frac{\text{Aim Contrast} - \text{Brightness}}{528} \left\{ \begin{array}{l} \text{Bri-E} \\ 10 \end{array} \right\} \frac{\text{Aim Contrast (7:3)}}{128} + \text{Brightness}$$

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Date

17014

Subject: Meaning of $B_{nA} \times n1$

$$B_{nA} \times n1 = (\text{NOT}(B_{nA} \times 1)) + 1$$

$$B_{nA} \times 1 = B_{nA} \times 1 \oplus B_{nA} \times 1 \oplus B_{nA} \times 1 \oplus B_{nA} \times 1$$

Assume $B_{nA} = 00000001$

$$\Rightarrow B_{nA} \times 1 = 000000000001$$

$$\Rightarrow B_{nA} \times n1 = 1111111110 + 1$$

$$= 1111111111 \quad (\text{complement of } B_{nA})$$

Assume $B_{nA} = 00010000$

$$\Rightarrow B_{nA} \times 1 = 00000010000$$

$$\Rightarrow B_{nA} \times n1 = 11111011111$$

$$= 11111110000 \quad (\text{complement of } B_{nA})$$

Assume $B_{nA} = 11000010$

$$\Rightarrow B_{nA} \times 1 = 11111000010$$

$$\Rightarrow B_{nA} \times n1 = 000000111101 + 1$$

$$= 000000111110 \quad (\text{complement of } B_{nA})$$

$$\Rightarrow B_{nA} \times n1 = \text{complement of } B_{nA} \times 1$$

$$B_{nA} \times n1 \text{ is a MSB bit} = \text{complement of } B_{nA}$$

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Contrast $0 \sim 255$ $C \rightarrow \text{無圖形} = \text{Brightness}$ $128 \rightarrow A_{in} + \text{Brightness}$ $255 \rightarrow \sim 2 \times A_{in} + \text{Brightness}$

$$IP_{sm} = A_m \times \frac{\text{contrast}}{128} + \text{Brightness}$$

Brightness 2's complement

~~Brightness~~
 $\text{Brightness} = 0 \times \times \times \times \times \times \Rightarrow \text{正值}$

 $1 \times \times \times \times \times \times \Rightarrow \text{負值}$
 $-128 \sim 127$ Brightness < 128 (or 127) $\Rightarrow IP_{sm}$ 4-bit clk

出現 Brightness (值)

$$A_{in} \times \frac{\text{contrast}}{128} + \text{Brightness} < 0$$

$$\Rightarrow \text{Brightness} < -A_{in} \times \frac{\text{contrast}}{128} \quad \text{時 } IP_{sm} = 0$$

$$\rightarrow -\text{Brightness} > A_{in} \times \text{contrast} / 128$$

$$\Rightarrow |A_{in} \times \text{Brightness}| > A_{in} \times \text{contrast} \quad \text{時 } IP_{sm} = 0$$

Brightness 負數時

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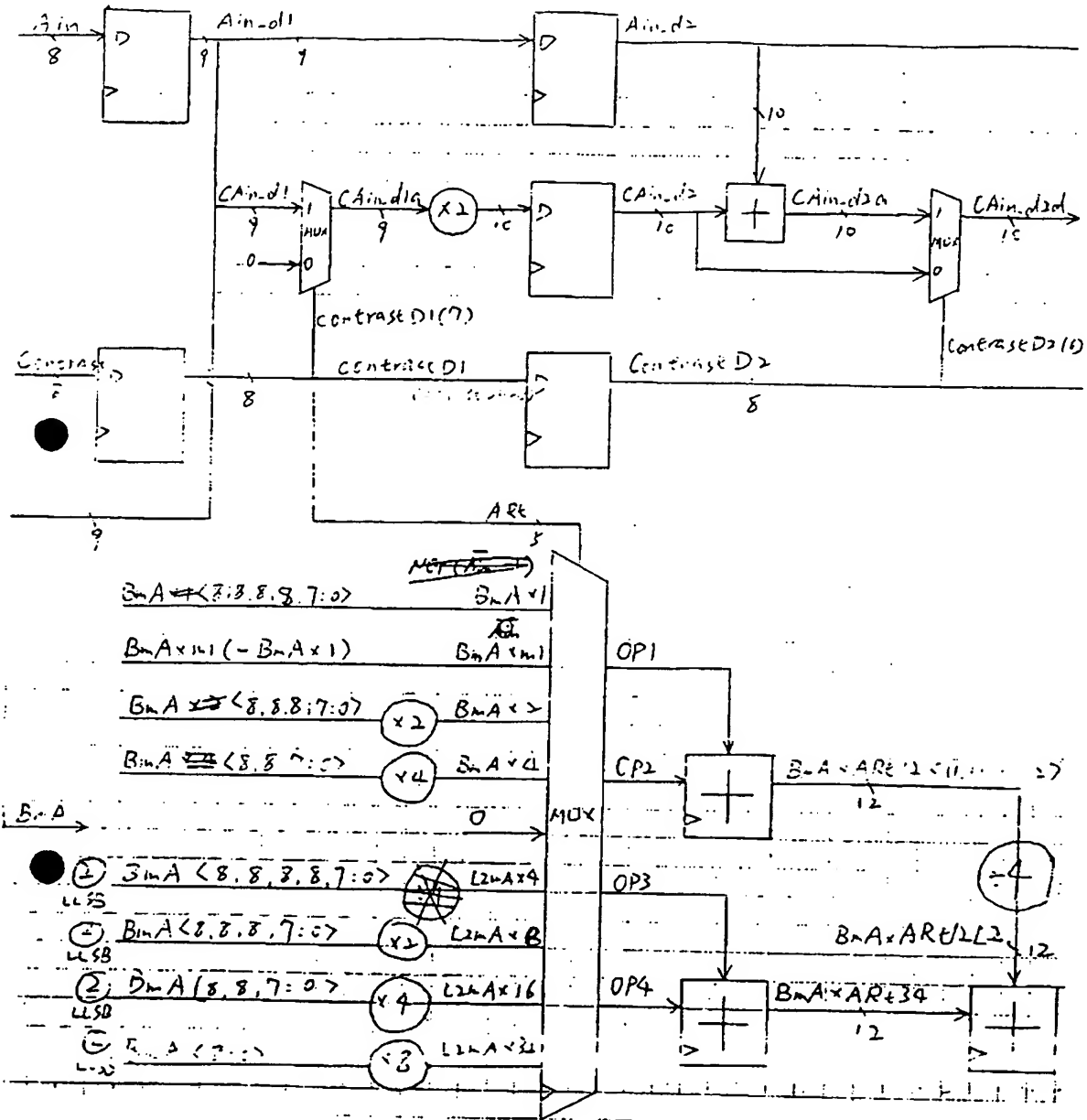
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Date: 2000/3/13

17010

Subject: Contrast & Brightness Control Flow



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Signature: 3/1/17

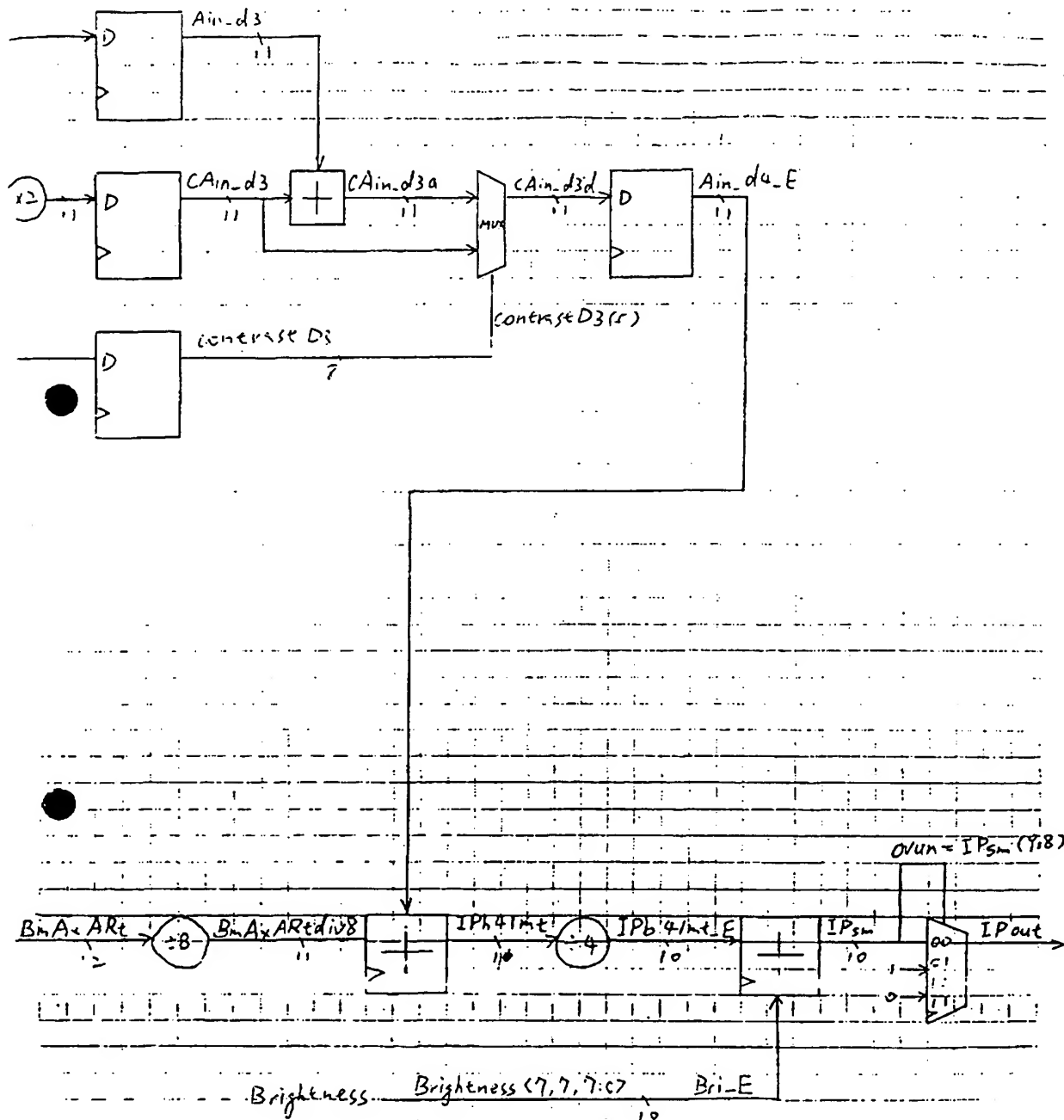
Date: 2017/3/17

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Subject: _____

17017



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TR000479

Subject: Contrast & Brightness YUV design

2.8 Color adjust, color space convert (matrix), and gamma

The OSLO chip performs color space conversion before color adjust and gamma after.

The YUV adjustments are

$$Y_{out} = (Y - Y_{black}) * \text{contrast} + \text{brightness}$$

$$U_{out} = (U * \cos(\text{hue}) + V * \sin(\text{hue})) * \text{saturation} = U * \text{sat_coshue} + V * \text{sat_sinhue}$$

$$V_{out} = (V * \cos(\text{hue}) - U * \sin(\text{hue})) * \text{saturation} = V * \text{sat_coshue} - U * \text{sat_sinhue}$$

The RGB adjustments are

$$R_{out} = R * \text{contrast} + \text{brightness}$$

$$G_{out} = G * \text{contrast} + \text{brightness}$$

$$B_{out} = B * \text{contrast} + \text{brightness}$$

TABLE 3.

sat_sinhue correction for MSB=0						
sat_sinhue[7:0]	7f(hex)	7e	.....	02	01	00
multiply value	127/64	126/64	.....	2/64	1/64	0/64
sat_sinhue correction for MSB=1						
sat_sinhue[7:0]	ff(hex)	fe	.....	82	81	80
multiply value	-1/64	-2/64	.....	-126/64	-127/64	-128/64

sat_coshue correction for MSB=0						
sat_coshue[7:0]	7f(hex)	7e	.....	02	01	00
multiply value	127/64	126/64	.....	2/64	1/64	0/64
sat_coshue correction for MSB=1						
sat_coshue[7:0]	ff(hex)	fe	.....	82	81	80
multiply value	-1/64	-2/64	.....	-126/64	-127/64	-128/64

Yblack correction for MSB=0							
Yblack[7:0]	7f(hex)	7e	7d	.....	02	01	00
offset value	127	126	125	.....	2	1	0
Yblack correction for MSB=1							
Yblack[7:0]	ff(hex)	fe	fd	.....	82	81	80
offset value	-1	-2	-3	.....	-126	-127	-128

TABLE 4.

Contrast correction for MSB=0						
contrast[7:0]	7f(hex)	7e	.....	02	01	00
multiply value	255/128	254/128	130/128	129/128	128/128
Contrast correction for MSB=1						

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Date: 10/15/14

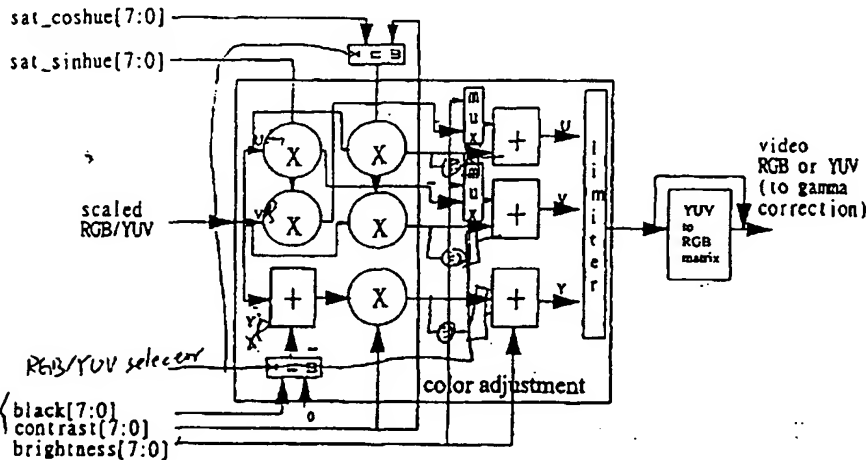
TABLE 4.

contrast[7:0]	ff(hex)	fc	82	81	80
multiply value	127/128	126/128	2/128	1/128	0/128

Brightness correction for MSB=0						
brightness[7:0]	7f(hex)	7c	7d	.....	02	01
offset value	127	126	125	.....	2	1
Brightness correction for MSB=1						
brightness[7:0]	ff(hex)	fc	fd	.....	82	81
offset value	-1	-2	-3	.....	-126	-127

The block diagram is depicted as follows:

FIGURE 11. Functions of matrix and color adjustments for YUV and RGB



工作频率 120 MHz

YUV 8 bits

sat-sinhue & sat-coshue: -2 ~ +2

Y black correction = -128 ~ +127

Brightness

Contrast: 0 ~ 2 but 7F 80 ~ FF $\Rightarrow \frac{1}{2} [(-128 - 127) + 128]$

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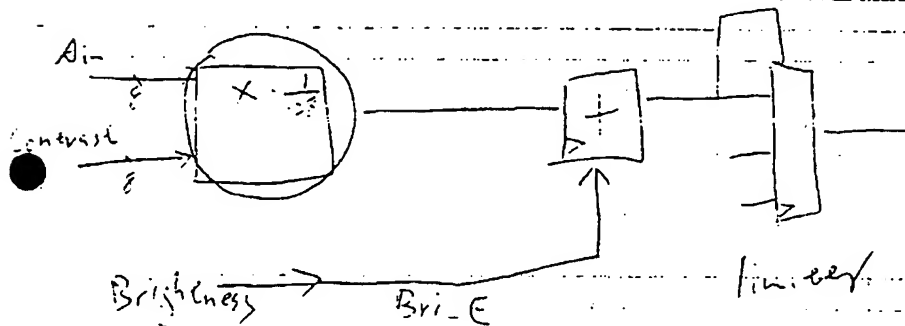
25/3/24

17020

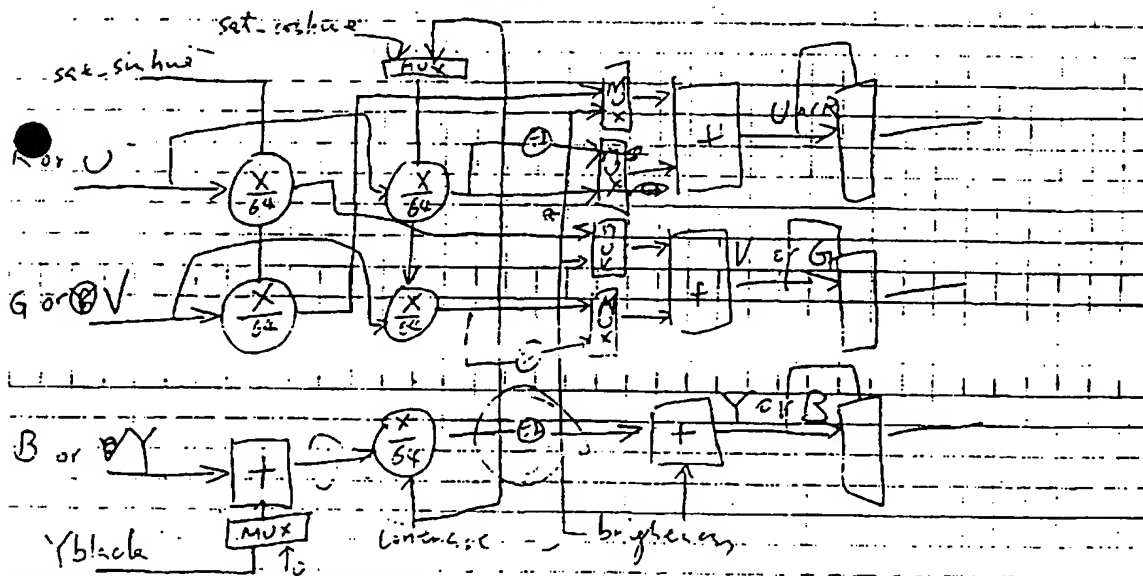
Subject: _____

(X) A (=64) R.G.B = 128 B = 2
Y.U.V

- 1/2 ZURAC = Contrast & Brightness 可調之字



In practice - 2 or 3 x 1 由 MUX 決定



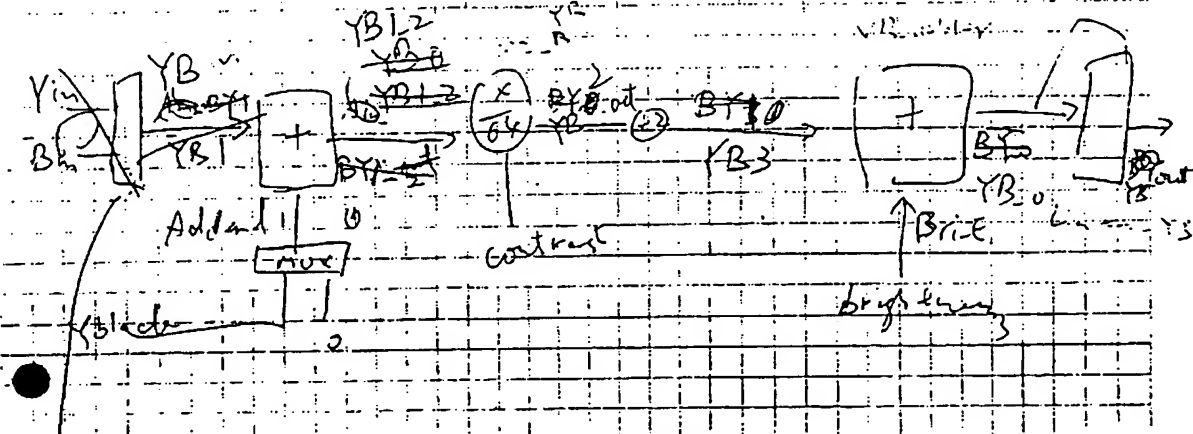
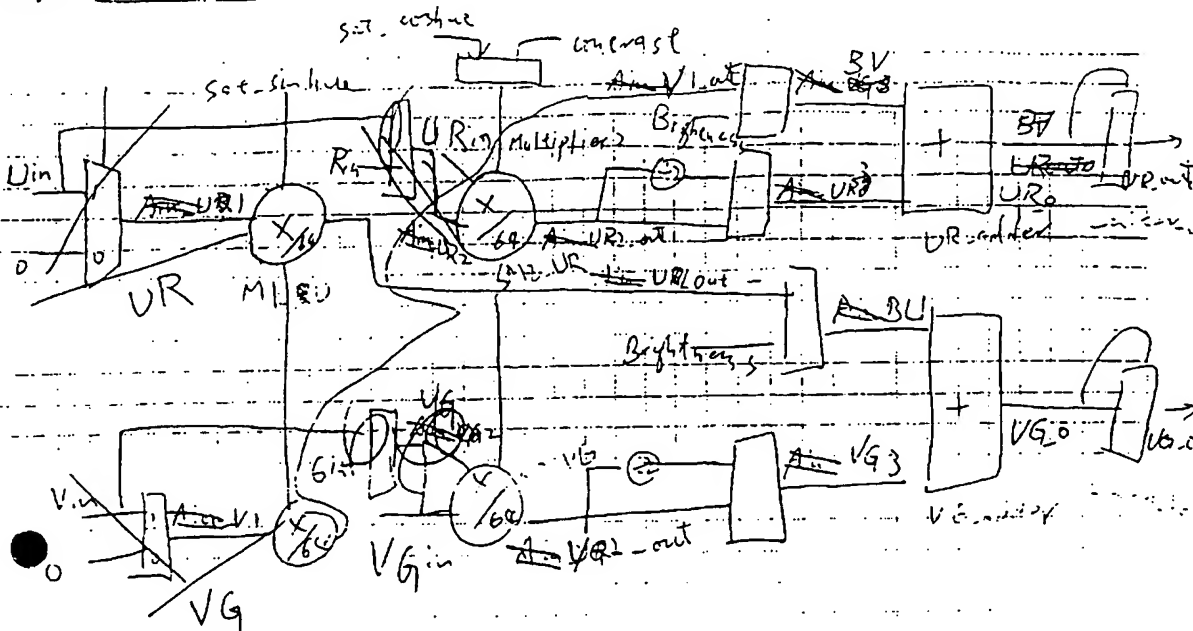
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Subject: _____

17021



RGB/YUV Sel.

UR in 10-100 input

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Date: 20/3/27

17022

Subject: Converse x A in candy

$$B \wedge A \in A_m$$

$$B \wedge A \times 1 = B \wedge A (0.8.8.8.0.0) = \text{NOT}(\overline{A_m} - 1)$$

$$B \wedge A \times 2 = B / \text{NOT}(B \wedge A \times 1) + 1 = \overline{A_m}$$

OP1 + OP2

$$B \wedge A \times 2 = B \wedge A (0.8.8.0.0) \pm 0 = \text{NOT}(\overline{A_m} - 1) \times 2$$

$$B \wedge A \times 4 = B \wedge A (8.8.0.0.0.0) = \text{NOT}(\overline{A_m} - 1) \times 4$$

B

$$L2 \wedge A \times 4 = B \wedge A (0.8.8.8.0.0) = \text{NOT}(\overline{A_m} - 1)$$

$$= B \wedge A \times 1$$

$$L2 \wedge A \times 8 = B \wedge A (0.8.8.0.0.0) = \text{NOT}(\overline{A_m} - 1) \times 2$$

OP3 + OP4

$$= -B \wedge A \times 2$$

$$L2 \wedge A \times 16 = B \wedge A (8.8.0.0.0.0) = \text{NOT}(\overline{A_m} - 1) \times 4$$

$$= B \wedge A \times 4$$

$$L2 \wedge A \times 32 = B \wedge A (8.8.0.0.0.0) = B \wedge A \times 8$$

OP1 + OP2

$$= B \wedge A \times \text{ARE12} L2 = B \wedge A \times \text{ARE12} (1.1.1.1.1.2)$$

$$= \text{NOT}(B \wedge A \times \text{ARE12} - 1) / 4$$

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Date: 2000/3/18

convert	multiply	convert
0	0	80
1	1	81
2	2	
FE	FE	
7F	128	FE
80	128	00
81	129	01
FE	124	7E
FE	125	7F

sat. 5:15 & was here 2:21 convert 0~2

2 convert = 80 → 80 1/2 1/8 × 128

$= 100000000$

100000000

⇒ OP1 = 0 OP2 = 0 (contrast) = 1

⇒ $A_{in} = d_{v-c} = A_{in} \times 80$

⇒ $IP_{sum} = A_{in} + NAT(Brightening - 1)$

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Name _____	Date _____	Date: <u>2020/1/12</u>

17024

Subject: _____

$$\text{設 } AR_4 = 11101 = 29$$

$$\Rightarrow OP_1 = B \ll A \times 1 = \text{NOT}(\overline{A_4} - 1)$$

$$OP_2 = B \ll A \times 4 = \text{NOT}(\overline{A_4} - 1) \times 4$$

$$OP_3 = L \ll A \times 8 = \text{NOT}(\overline{A_4} - 1) \times 2 = B \ll A \times 2$$

$$OP_4 = L \ll A \times 16 = B \ll A \times 4 = \text{NOT}(\overline{A_4} - 1) \times 4$$

$$\Rightarrow OP_1 + OP_2 = \text{NOT}(\overline{A_4} - 1) \times 5$$

$$OP_3 + OP_4 = \text{NOT}(\overline{A_4} - 1) \times 6$$

結果, 不允許 $\overline{A_4}$ 在 1

2's complement 為 $2^n - A_{in}$

$$B \ll A \times 1 = (\text{NOT}(B \ll A \times 1)) + 1 = 2^{12} - A_{in}$$

$$B \ll A \times 1 = B \ll A (8, 8, 8, 0) = \text{NOT}(2^{12} - A_{in} - 1) = L \ll A \times 4$$

$$B \ll A \times 2 = B \ll A (9, 8, 8, 0) = \text{NOT}(2^{12} - A_{in} - 1) \times 2 = L \ll A \times 8$$

$$B \ll A \times 4 = B \ll A (9, 8, 8, 0) = \text{NOT}(2^{12} - A_{in} - 1) \times 4 = L \ll A \times 16$$

$$L \ll A \times 32 = B \ll A (8, 0, 0, 0) = A_{in} \times 8$$

$$\text{Brightness}^E = \text{Brightness} (7, 7, 7, 0) = (2^{12} - \text{Brightness} - 1)$$

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$$\sum_{i=0}^7 AR_i = 11111 = 31$$

$$\Rightarrow OP1 + OP2 = 2^{12} \cdot A_{in} \rightarrow \cancel{A_{in}} / 4$$

$$OP3 + OP4 = A_{in} \times 8$$

$$\Rightarrow \cancel{B \cdot A \cdot AR_i} = 2^{12}$$

$$\Rightarrow B \cdot A \cdot AR_i = 12(11, 11, 11:2) = NOT(2^{14} - (2^{12} \cdot A_{in}) - 1) / 4$$

$$= NOT(2^{16} - 2^{12} + A_{in} - 1) / 4$$

$$\Rightarrow B \cdot A \cdot AR_i = A_{in} \times 8 + NOT(2^{16} - 2^{12} + A_{in} - 1) / 4$$

原始的 Contrast - Brightness

Brightness 范围 -128 ~ 127 与现在同

Contrast 范围 0 ~ 255 / 128 $\therefore = 0 \sim 2 \left(\frac{255}{128} \right)$

但和现在排列不同

昔 0 ~ 7F 80 ~ FF

今 0 127 128 255

今 128 255 0 127 / 128

今 0 127 128 1 / 255

$$\therefore \text{contrast} = \text{sat} - \text{orig} + 128 / 128$$

$$\therefore \text{sat} - \text{orig} = \text{contrast} - 128 / 128$$

$A_{in} \times \text{contrast}$

or $A_{in} \times \text{sat} - \text{orig}$

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Date: 2/3/8

17026

Subject: set-value & cat-value study

參考圖表設計

$$\left(\frac{x}{64}\right)$$

$$\text{contrast}(7) = 1 \leftrightarrow 0$$

~~Ain x set-value~~~~Ain x set-value~~

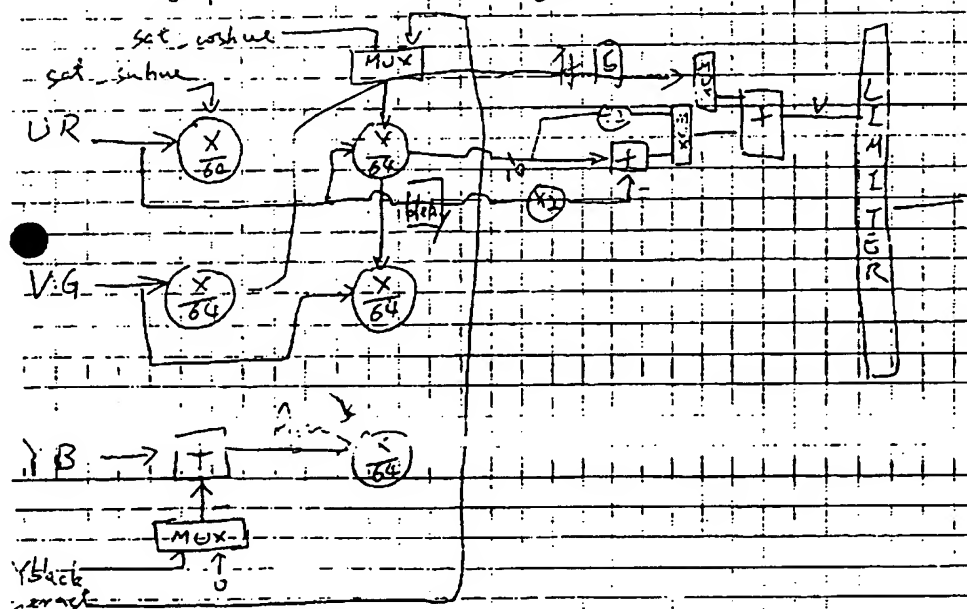
$$\text{Ain} \times \text{multiplier} = \text{Ain} \times \text{contrast}$$

set-value

$$\bullet \text{Ain} \times \frac{\text{set-value}}{64} = \text{Ain} \times (\text{contrast} - 128)$$

$$= \text{Ain} \times \text{contrast} - 128 \times \text{Ain}$$

$$\frac{\text{Ain} \times \text{set-value}}{64} = \frac{\text{Ain} \times \text{contrast}}{64} - 2 \times \text{Ain}$$



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Date: 2000/2/28

$A_{in} \leq '0' \& A_{in} < 8:0 > < 8 > < 7:0 >$

$B_{in} \times 1 = A_{in} \times 1 \& A_{in} = A_{in} = L_{in} \times 4$

$B_{in} \times 1 = (NOT(B_{in} \times 1)) + 1 = 2^{10} - A_{in}$

$B_{in} \times 2 = A_{in} \times 2 = L_{in} \times 8$

$B_{in} \times 4 = A_{in} \times 4 = L_{in} \times 16$

$L_{in} \times 32 = A_{in} \times 8$

VHDL code 中

process (sensitivity list)

↓

最好把所有變數應傳入之值列入

才會隨時開而隨時傳入

Y, U, V 有可能延遲數

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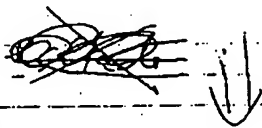
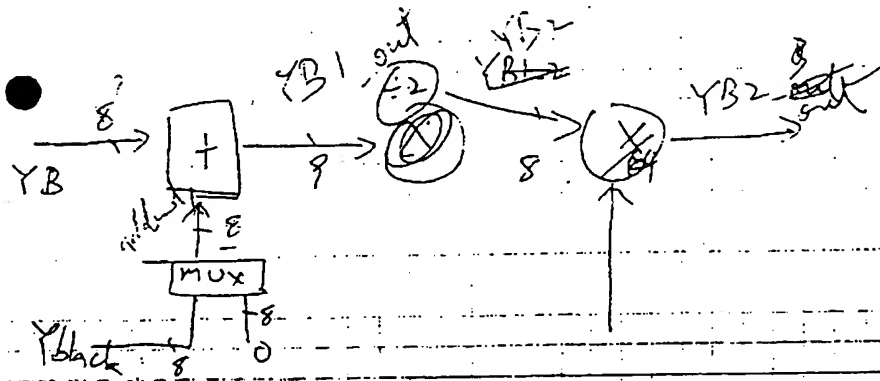
Date: 2000/3/28

subject: 17028 Y black discuss

= Y_black + Y - 1 bit = 128 + (128) = 256

把后面的 02 移到前面

加法需增加 1 bit



会有 -1 bit 的损失

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Date: 2003/3/29

Subject: _____

17029

Y, U, V, R, G, B 皆为正值

$\Rightarrow Y - Y_{black}$ 可能为负

Y 和 Y_{black} 皆为 8 bit

Y : 0 ~ 255 Y_{black} : -128 ~ 127

\Rightarrow 每个 8 bit (MSB) 表示不同 Y : 128 ~ 255
 Y_{black} : -128 ~ 0-1

\Rightarrow 各需加一个 bit

$Y_{black}(7:0) \rightarrow 00000001$

$Y_{black}(7:0) \rightarrow Y_{black}(7) \& Y_{black}(7:0)$

$-(Y_{black}(7:0)) = NOT(Y_{black}(7:0)) + 1$

assume $Y_{black} = 00000001$

$\Rightarrow -Y_{black}(7:0) = 11111111$

若 Y - Y_{black} 为负数, 1 之后 \Rightarrow 补数

$\Rightarrow Y$ 为最大值, Y_{black} 非补数在 Multiply 中

Max 在 128 若 $Y - Y_{black}$ 为负数

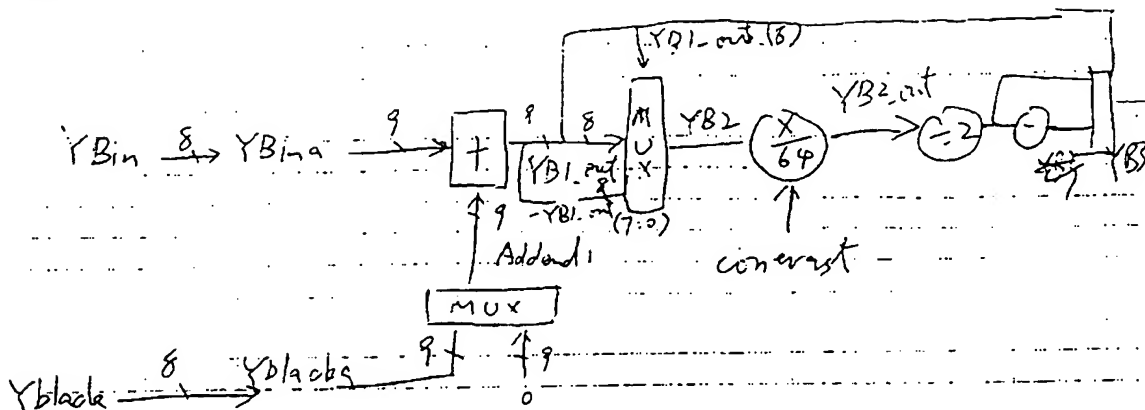
\Rightarrow 补数正数 \rightarrow 补数 + brightness

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17030
Subject:



OR another way is

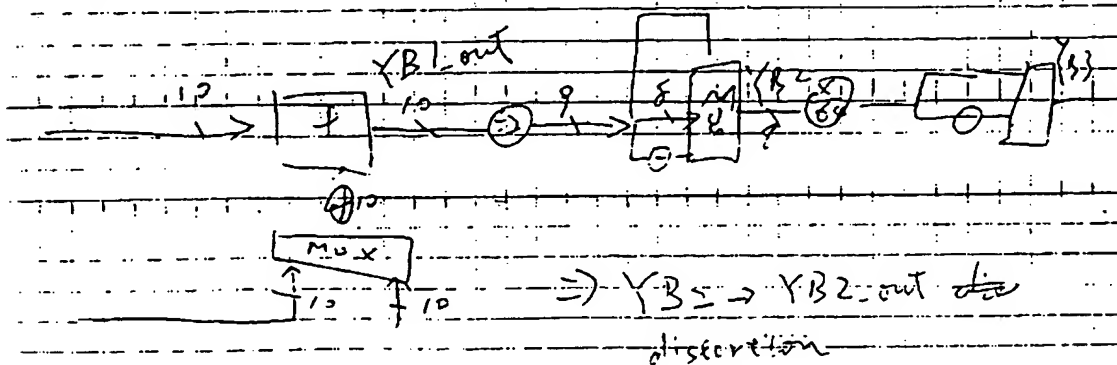
$Y_{Bin} \sim 0 \sim 255 \rightarrow 9\text{-bit}$

$Y_{Black} \sim -128 \sim -127 \rightarrow 9\text{-bit}$

$$\Rightarrow Y_{Bin} - Y_{Black} = -127 \sim (255 + 128)$$

$$= -127 \sim 383 \rightarrow 9\text{-bit}$$

For YUV



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17032

Subject: YUV & RGB range

$$Y_{out} = (Y - Y_{black}) \times contrast + brightness$$

$$U_{out} = (U \times sat_{blue} + V \times sat_{red}) \times hue$$

$$V_{out} = V \times sat_{red} - U \times sat_{blue}$$

$$RGB_{out} = RGB \times contrast + brightness$$

input of Y, U, V, RGB, YUV 0 ~ 255

$$sat_{blue} = -\frac{128}{64} \sim \frac{127}{64}$$

$$sat_{red} = \frac{-128}{64} \sim \frac{127}{64}$$

$$Y_{black} = -128 \sim 127$$

$$contrast = 0 \sim 255/128$$

$$brightness = -128 \sim 127$$

$$Y_{out} = (0 - 127) \times \frac{255}{128} = -128 \sim (255 + 128) \times \frac{255}{128} + 127$$

$$= -581 \sim 290$$

$$U_{out} = 255 \times \left(\frac{-128}{64} \right) + 255 \times \frac{-128}{64} \sim 255 \times \frac{127}{64} + 255 \times \frac{127}{64}$$

$$V_{out} = 255 \times \frac{-128}{64} - 255 \times \frac{127}{64} \sim 255 \times \frac{127}{64} - 255 \times \frac{-128}{64}$$

$$V_{out} = 255 \times \frac{-128}{64} - 255 \times \frac{127}{64} \sim 255 \times \frac{127}{64} - 255 \times \frac{-128}{64}$$

$$= -1016 \sim 1016$$

$$RGB_{out} = 255 \times (0 \sim \frac{255}{128}) + (-128 \sim 127) \sim -128 \sim 631$$

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加接 brightness 的因子

$Y_o : -253 \sim 763 \Rightarrow 11 \text{ bit}$

$U_o : -1020 \sim 1012 \rightarrow 10 \text{ bit}$

$V_o : -1016 \sim 1016 \rightarrow 10 \text{ bit}$

$RGB_o : 0 \sim 508 \rightarrow 10 \text{ bit}$

wherease

0	127	128	255
0	7F	80	FF
128	128	128	128
128	128	128	128

7 bit transfer make the right value

$Y_{out} : 11 \text{ bits}$

$U_{out} : 10 \text{ bits}$

$V_{out} : 10 \text{ bits}$

$RGB_{out} : 10 \text{ bits}$

lessing $Y_{out} : 8 \text{ bit}$ where

$-128 \sim -127 \rightarrow 8 \text{ bit}$
$-256 \sim -255 \rightarrow 9 \text{ bit}$
$-512 \sim -511 \rightarrow 10 \text{ bit}$
$-1024 \sim -1023 \rightarrow 11 \text{ bit}$

加接 $\rightarrow 0$ $\rightarrow 255 \rightarrow 255$

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Subject: 11

$$Y_{out} = (i - Y_{black}) \cdot \text{contrast} + \text{brightness}$$

$$[RGB = \{2\} = 1]$$

1. 函数最大值 $\rightarrow y=0 \Rightarrow 0.2$

Y6126 = 127 = 27F

$$\text{Wertverlust} = 255/108 \Rightarrow -7F$$

brightness = $-1.28 \Rightarrow 2.80$

2. 正数最大值 $\Rightarrow Y = 255 \Rightarrow \dots F.F$

$$1/6 \cdot 1/5 = 1/30 \Rightarrow 30$$

Converg. \Rightarrow 7. f.

$$b_{\text{right}}(s) = 12.7 \Rightarrow 7F$$

3. testing $Y \Rightarrow Y_{back} = 0 \Rightarrow 00$

$$\text{contrast} = 1 \Rightarrow 00$$

$$k_{\text{brightness}} = 0 \Rightarrow 00$$

$$(B_m = 0) \Rightarrow \forall B_{out} = 0$$

$$y_{11} = (P/P) \Rightarrow P_{B, out} = 24 \text{ T}$$

4. existing yblock \rightarrow $y = 0(10) \rightarrow$

~~- base = (1, 0, 0)~~

brightness = 0 (0?)

$$(-b \pm \sqrt{b^2 - 4ac}) = 7 \pm (-12) = \frac{-9 \pm 12}{2} = \frac{3}{2}, \frac{-21}{2}$$

$$Y_{300} = \frac{0}{FF} \Rightarrow FF \Rightarrow \frac{0}{FF} \Rightarrow FF \Rightarrow FF \Rightarrow 0 \Rightarrow 0 \Rightarrow 1 \Rightarrow 80$$

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~~Testing block $\Rightarrow Y = \frac{127}{128} (7F)$ $Y_{block} = 0(00)$ $B = 0(00)$~~

~~$EC = 127/128 (7F)$ $\Rightarrow Y_{out} = 253, 255, \dots$~~

~~$Y = \frac{127}{128} (7F)$ $Y_{block} = 0$ $B = 0(00)$~~

~~$C = \frac{127}{128} (7F)$ $\Rightarrow Y_{out} = 0$~~

~~$Y = \frac{127}{128} (7F)$ $Y_{block} = 7E$~~

~~$B = 0, C =$~~

1. testing contrast

① positive $\gamma = \frac{127(177) - 128(155)}{10(18)} = 9.87$

6. testing brightness

(Y-1 block) conversion = 120%

$$Y = 1207 \pm (7E-F)$$

$$\gamma_{black} = 0 = (0, 0).$$

$$\cos^{-1} \frac{1}{\sqrt{2}} = (0.707) = 45^\circ$$

$$\text{bright} = -128(80), -127(81), -126(82), 0(0), 127(7F)$$

$$\Rightarrow Y_{\text{max}} = 0, 0, \dots, 1, \dots, 7F, \dots, 256 (FF)$$

∴ To find Y_{out} For ~~the~~ equation - line is

$$Y_{out} = 0 \rightarrow FF \rightarrow 0 \rightarrow FF \rightarrow 0 \rightarrow 0 \rightarrow 1 \rightarrow 8V \quad \checkmark$$

→ $FE \rightarrow FF \rightarrow FE \rightarrow FD \rightarrow 7F \rightarrow 01 \rightarrow 0$

$\rightarrow 0 \rightarrow 0 \rightarrow 1 \xrightarrow{\delta} F \rightarrow 0 \xrightarrow{\beta} 1 \xrightarrow{\gamma} 1$ ✓

(B.0	2865	683	782	782	002
	7.2	782			

→ 0 → 0 → 1 → 7F → 1E

YB-2 OFB OFE 5

Law firm

→ ५३५ - ५३० प्रतिदिन

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~~RGB~~ ~~RGB~~

$$RGB_{out} = RGB \times \text{contrast} + \text{brightness}$$

$$RGB_{YUV_sel} = 0$$

$$RGB \sim 255$$

$$\text{contrast} \sim \frac{255}{128}$$

$$\text{brightness} \sim 128 \sim 127$$

$$1. \text{ 最正色 } \rightarrow RGB = 255 (FF) \text{ } C = \frac{255}{128} (7F), B = 127 (7F)$$

$$\Rightarrow CUT = FF$$

$$2. \text{ 最亮色 } = RGB \times \text{contrast} + \text{brightness} = 128 (80)$$

$$\begin{cases} RGB = AA, BB, CC \\ \text{contrast} = 0 (80) \end{cases} \begin{matrix} 0 \\ 08 \\ CC \end{matrix}$$

$$\Rightarrow CUT = 0, 0$$

$$3. \text{ change RGB } \text{contrast} = \frac{127}{128} (7F) \quad B = 0 (00)$$

$$RGB = 10, 11, FF, FF, 7F, 80$$

$$\Rightarrow CUT = 0, FF, FF, 7F, 80$$

$$4. \text{ change contrast}$$

$$RGB = 127 (8F) \quad B = 0 \quad \text{contrast} = 0 (80) \quad \frac{127}{128} (7F) \quad \frac{127}{128} (7F)$$

$$CUT = 0, 127 (8F), 127 (8F), FF, FF, FF, 7F$$

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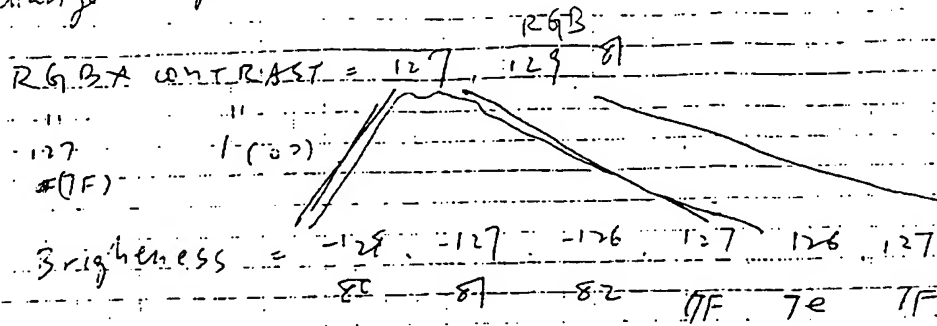
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5. change brightness



OUT = 0, 0, 1, 2.56(FE), FF, FF

Total RGB_out for equation case is

RGB_out = FF → 0 → 0 → 0 → 1 → FE → FF → 7F → 80

→ 0 → 7F → 81 → FF → FF → FE → FD ✓
→ 0 → 0 → 1 → FE → FF → FE ✓

Sat. cosine → SCOS

Sat. sine → SSIN

U_out = U cos + V SSIN

V_out = ~~U sin~~ V SCOS - U SSIN

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Subject: UV test

④ RGB-YUV sel → delay 7 times → next seg

UV subs system 4 variable

1. U 最大值 数值 → $U = V = 255 = FF$

$$S_{cos} = \frac{127}{64} = S_{cos} (7F)$$

$$\Rightarrow U_{out} = 255 \quad V_{out} = 0$$

2. U-out 最大值 → $U = 1 = 255 = FF$

$$S_{cos} = \frac{127}{64 (7F)} \rightarrow S_{sin} = -2 (80)$$

U: V : 0 ~ 255

$$S_{cos} \quad S_{sin} = \frac{127}{64}$$

$$\Rightarrow \begin{cases} S_{cos} = 0 \\ U = 0 \\ L, V = 0 \end{cases}$$

1. $V = 0$

$$U = 255 (7F)$$

$$S_{cos} = -2 (80)$$

$$S_{cos} = -2 (80)$$

U-out : 1012 ~ 1012

V-out

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11040
Subject: UV test

$$U_{out} = U \cos + V \sin$$

$$V_{out} = V \cos - U \sin$$

1. Variable: U 0-255

$$S \cos = \frac{65}{64} (41)$$

$$V = 0$$

$$S \sin = -\frac{65}{64} (BF)$$

~~U_{out}~~
 $U: 0 \quad 255 \quad 254 \quad 253 \quad 252 \quad 251 \quad 250 \quad 249 \quad 248 \quad 247 \quad 246 \quad 245 \quad 244 \quad 243 \quad 242 \quad 241 \quad 240 \quad 239 \quad 238 \quad 237 \quad 236 \quad 235 \quad 234 \quad 233 \quad 232 \quad 231 \quad 230 \quad 229 \quad 228 \quad 227 \quad 226 \quad 225 \quad 224 \quad 223 \quad 222 \quad 221 \quad 220 \quad 219 \quad 218 \quad 217 \quad 216 \quad 215 \quad 214 \quad 213 \quad 212 \quad 211 \quad 210 \quad 209 \quad 208 \quad 207 \quad 206 \quad 205 \quad 204 \quad 203 \quad 202 \quad 201 \quad 200 \quad 199 \quad 198 \quad 197 \quad 196 \quad 195 \quad 194 \quad 193 \quad 192 \quad 191 \quad 190 \quad 189 \quad 188 \quad 187 \quad 186 \quad 185 \quad 184 \quad 183 \quad 182 \quad 181 \quad 180 \quad 179 \quad 178 \quad 177 \quad 176 \quad 175 \quad 174 \quad 173 \quad 172 \quad 171 \quad 170 \quad 169 \quad 168 \quad 167 \quad 166 \quad 165 \quad 164 \quad 163 \quad 162 \quad 161 \quad 160 \quad 159 \quad 158 \quad 157 \quad 156 \quad 155 \quad 154 \quad 153 \quad 152 \quad 151 \quad 150 \quad 149 \quad 148 \quad 147 \quad 146 \quad 145 \quad 144 \quad 143 \quad 142 \quad 141 \quad 140 \quad 139 \quad 138 \quad 137 \quad 136 \quad 135 \quad 134 \quad 133 \quad 132 \quad 131 \quad 130 \quad 129 \quad 128 \quad 127 \quad 126 \quad 125 \quad 124 \quad 123 \quad 122 \quad 121 \quad 120 \quad 119 \quad 118 \quad 117 \quad 116 \quad 115 \quad 114 \quad 113 \quad 112 \quad 111 \quad 110 \quad 109 \quad 108 \quad 107 \quad 106 \quad 105 \quad 104 \quad 103 \quad 102 \quad 101 \quad 100 \quad 99 \quad 98 \quad 97 \quad 96 \quad 95 \quad 94 \quad 93 \quad 92 \quad 91 \quad 90 \quad 89 \quad 88 \quad 87 \quad 86 \quad 85 \quad 84 \quad 83 \quad 82 \quad 81 \quad 80 \quad 79 \quad 78 \quad 77 \quad 76 \quad 75 \quad 74 \quad 73 \quad 72 \quad 71 \quad 70 \quad 69 \quad 68 \quad 67 \quad 66 \quad 65 \quad 64 \quad 63 \quad 62 \quad 61 \quad 60 \quad 59 \quad 58 \quad 57 \quad 56 \quad 55 \quad 54 \quad 53 \quad 52 \quad 51 \quad 50 \quad 49 \quad 48 \quad 47 \quad 46 \quad 45 \quad 44 \quad 43 \quad 42 \quad 41 \quad 40 \quad 39 \quad 38 \quad 37 \quad 36 \quad 35 \quad 34 \quad 33 \quad 32 \quad 31 \quad 30 \quad 29 \quad 28 \quad 27 \quad 26 \quad 25 \quad 24 \quad 23 \quad 22 \quad 21 \quad 20 \quad 19 \quad 18 \quad 17 \quad 16 \quad 15 \quad 14 \quad 13 \quad 12 \quad 11 \quad 10 \quad 9 \quad 8 \quad 7 \quad 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0$

$$U_{out}: 0 \quad FF \quad FE \quad FD$$

$$V_{out}: 0 \quad FF \quad FE \quad FD$$

2. Variable: V 0-255

$$S \cos = \frac{65}{64} (41)$$

$$U = 0$$

$$S \sin = \frac{65}{64} (51)$$

$$V: 0 \quad 255 \quad 254 \quad 253 \quad 252 \quad 251 \quad 250 \quad 249 \quad 248 \quad 247 \quad 246 \quad 245 \quad 244 \quad 243 \quad 242 \quad 241 \quad 240 \quad 239 \quad 238 \quad 237 \quad 236 \quad 235 \quad 234 \quad 233 \quad 232 \quad 231 \quad 230 \quad 229 \quad 228 \quad 227 \quad 226 \quad 225 \quad 224 \quad 223 \quad 222 \quad 221 \quad 220 \quad 219 \quad 218 \quad 217 \quad 216 \quad 215 \quad 214 \quad 213 \quad 212 \quad 211 \quad 210 \quad 209 \quad 208 \quad 207 \quad 206 \quad 205 \quad 204 \quad 203 \quad 202 \quad 201 \quad 200 \quad 199 \quad 198 \quad 197 \quad 196 \quad 195 \quad 194 \quad 193 \quad 192 \quad 191 \quad 190 \quad 189 \quad 188 \quad 187 \quad 186 \quad 185 \quad 184 \quad 183 \quad 182 \quad 181 \quad 180 \quad 179 \quad 178 \quad 177 \quad 176 \quad 175 \quad 174 \quad 173 \quad 172 \quad 171 \quad 170 \quad 169 \quad 168 \quad 167 \quad 166 \quad 165 \quad 164 \quad 163 \quad 162 \quad 161 \quad 160 \quad 159 \quad 158 \quad 157 \quad 156 \quad 155 \quad 154 \quad 153 \quad 152 \quad 151 \quad 150 \quad 149 \quad 148 \quad 147 \quad 146 \quad 145 \quad 144 \quad 143 \quad 142 \quad 141 \quad 140 \quad 139 \quad 138 \quad 137 \quad 136 \quad 135 \quad 134 \quad 133 \quad 132 \quad 131 \quad 130 \quad 129 \quad 128 \quad 127 \quad 126 \quad 125 \quad 124 \quad 123 \quad 122 \quad 121 \quad 120 \quad 119 \quad 118 \quad 117 \quad 116 \quad 115 \quad 114 \quad 113 \quad 112 \quad 111 \quad 110 \quad 109 \quad 108 \quad 107 \quad 106 \quad 105 \quad 104 \quad 103 \quad 102 \quad 101 \quad 100 \quad 99 \quad 98 \quad 97 \quad 96 \quad 95 \quad 94 \quad 93 \quad 92 \quad 91 \quad 90 \quad 89 \quad 88 \quad 87 \quad 86 \quad 85 \quad 84 \quad 83 \quad 82 \quad 81 \quad 80 \quad 79 \quad 78 \quad 77 \quad 76 \quad 75 \quad 74 \quad 73 \quad 72 \quad 71 \quad 70 \quad 69 \quad 68 \quad 67 \quad 66 \quad 65 \quad 64 \quad 63 \quad 62 \quad 61 \quad 60 \quad 59 \quad 58 \quad 57 \quad 56 \quad 55 \quad 54 \quad 53 \quad 52 \quad 51 \quad 50 \quad 49 \quad 48 \quad 47 \quad 46 \quad 45 \quad 44 \quad 43 \quad 42 \quad 41 \quad 40 \quad 39 \quad 38 \quad 37 \quad 36 \quad 35 \quad 34 \quad 33 \quad 32 \quad 31 \quad 30 \quad 29 \quad 28 \quad 27 \quad 26 \quad 25 \quad 24 \quad 23 \quad 22 \quad 21 \quad 20 \quad 19 \quad 18 \quad 17 \quad 16 \quad 15 \quad 14 \quad 13 \quad 12 \quad 11 \quad 10 \quad 9 \quad 8 \quad 7 \quad 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0$$

$$U_{out}: 0 \quad FF \quad FE \quad FD$$

$$3. Variable: S \cos = \frac{128}{64} = \frac{127}{64}$$

$$S \sin = 0 (20)$$

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$$3. \text{ Variable} = s \cos - \frac{128}{64} \sim \frac{127}{64}$$

$$s \sin = \frac{127}{64} (7F) \quad \text{for } U \quad \text{for } V$$

$$\text{CD } s \sin = \frac{127}{64} (7F)$$

$$\text{CD } s \sin = \frac{127}{64} (7F) \quad \text{for } V = 64 (840)$$

$$U = 6.5 (41)$$

~~22) out~~

$$s \cos = -\frac{128}{64} (81) - \frac{128}{64} (82) - \frac{128}{64} (83) \quad 0 \quad \frac{126}{64} (70) \quad \frac{127}{64} (71)$$

$$U_{\text{out}} = 0 \quad 0 \quad 0 \quad 0 \quad 1 \quad 127 (7F) \quad 24 \quad 25$$

$$V_{\text{out}} = 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

$$\text{CD } s \sin = -\frac{127}{64} (81) \quad U = 64 (40)$$

$$V = 6.6 (42)$$

$$s \cos = -\frac{128}{64} (80) - \frac{128}{64} (81) - \frac{128}{64} (82) \quad 0 \quad \frac{127}{64} (70) \quad \frac{127}{64} (71) \quad \frac{127}{64} (72)$$

$$V_{\text{out}} = 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

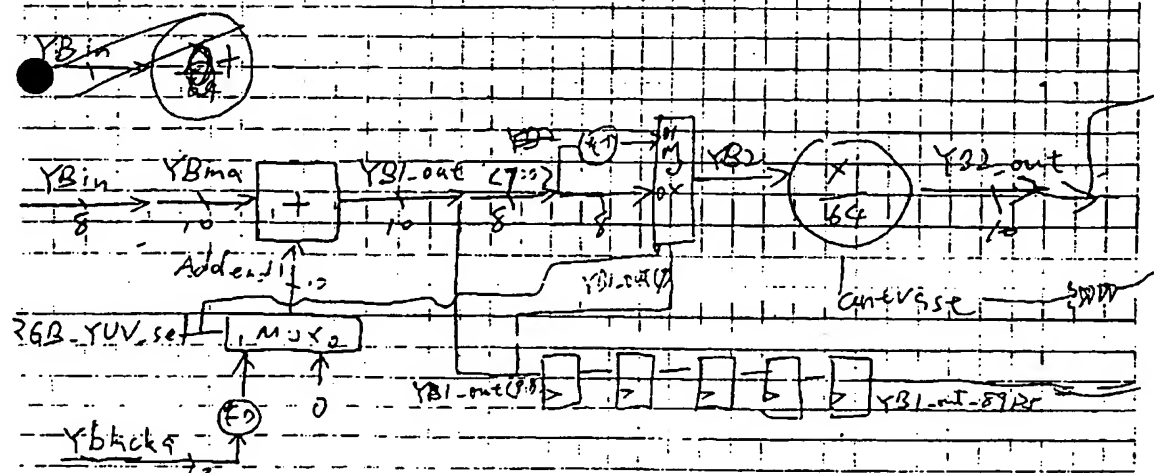
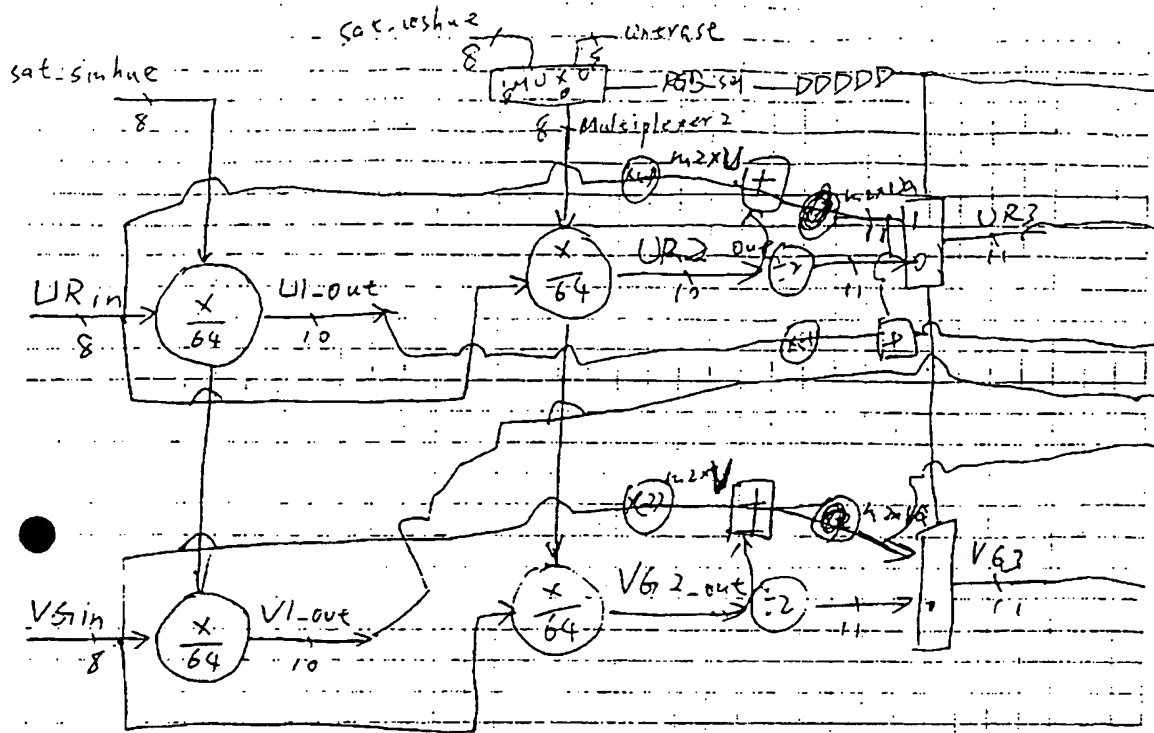
$$V_{\text{out}} = 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

$$\text{CD } s \sin = -\frac{127}{64} (81)$$

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17042
 Subject: YUV-RGB flow



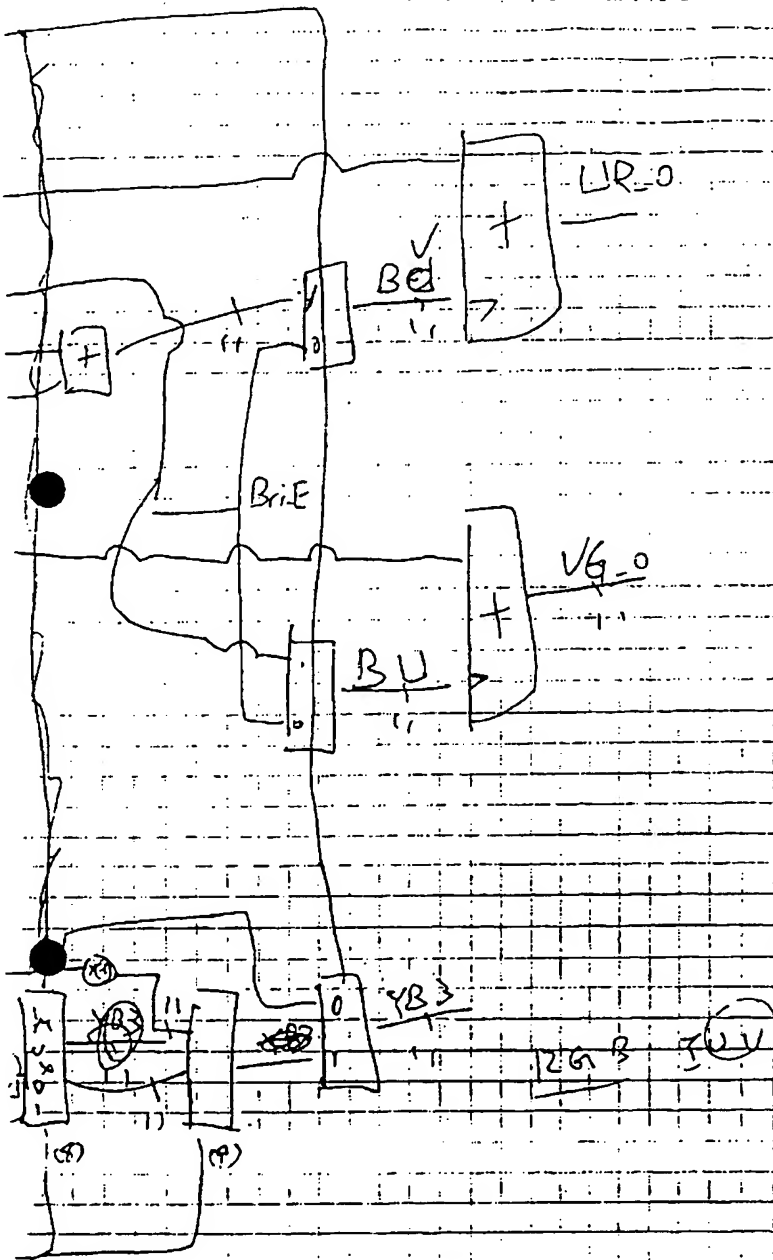
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17043



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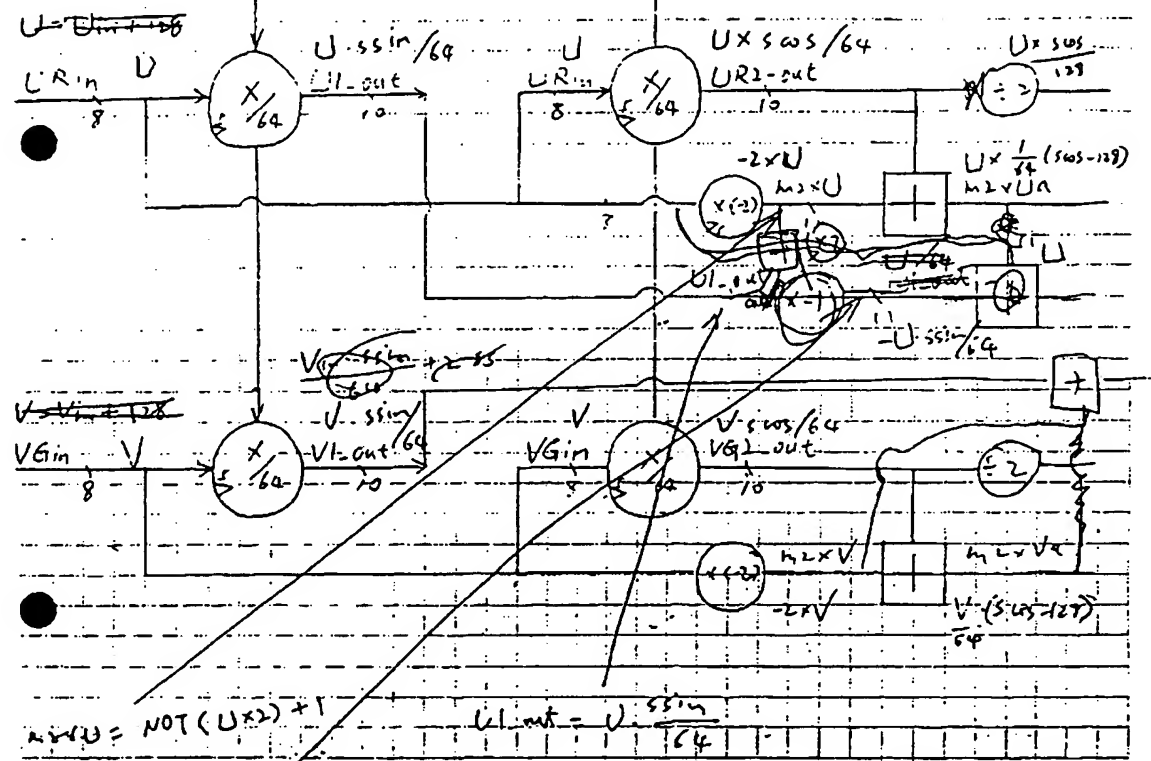
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sat. coshue = $\frac{sa}{cos} = sat. coshue + 128$

sat. sinhue
 $ssin = sat. sinhue + 128$



$NOT(U) = NOT(U \cdot s cos) + 1$

$U1-out = U \cdot \frac{ssin}{64}$

NOTICE

$BU = NOT(U \cdot \frac{ssin}{64} + NOT(U \cdot s cos) + 1) + 1$

$A = NOT(NOT(A + 1)) + 1 = NOT NOT A - 1 + 1$

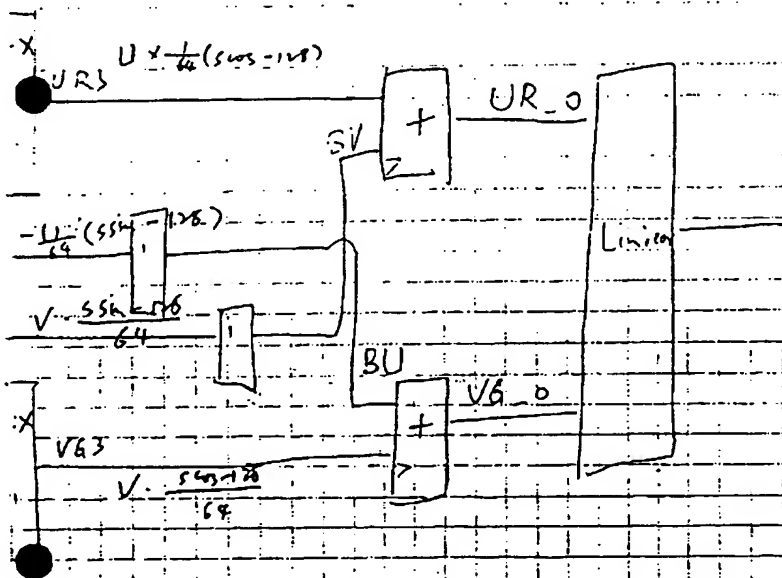
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17045



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4. variable: \sin

$$\cos = + \frac{127}{64} (87) \quad 8 - \frac{127}{64} (9F) \quad 87$$

$$\cos = + \frac{127}{64} (87) \quad (7F)$$

$$U = 64 (87) \quad V = 64 (42)$$

$$\sin = - \frac{127}{64} (87) \quad - \frac{127}{64} (87) \quad - \frac{127}{64} (87) \quad 0 \quad \frac{127}{64} (70) \quad \frac{127}{64} (7F)$$

U

$$U = 0 \quad 0 \quad 1 \quad 127 \quad 7F \quad 7F$$

$$V = 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

$$\Rightarrow U_{out} = 0 \quad 0 \quad 1 \quad 127 \quad 7F \quad 7F$$

$$V_{out} = \frac{127}{64} \times 64 \times \sin \times \frac{64}{64} = 127 \times 64 \sin \times \frac{64}{64}$$

$$\Rightarrow 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

al. variable

最大値と偏

$$U = 255 \quad V = 255 \quad \cos = \frac{127}{64} (7F) = \sin$$

$$\Rightarrow U_{in} = FE \quad V_{in} = 0$$

$$\sin = - \frac{127}{64} (87)$$

$$\Rightarrow U_{in} = 0 \quad V_{in} = FF$$

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04071
17047

$$U = \phi_{21} = V_0$$

$$5 \cos = - \frac{128}{64} (80) = -551$$

$$\Rightarrow U_{\text{out}} = V_{\text{out}}$$

$$551 = - \frac{127}{64} (7F)$$

$$\Rightarrow V_{\text{out}} = 0 = V_{\text{int}}$$

$$4. \textcircled{2} \quad 5 \cos = + \frac{127}{64} (7F) \quad U = 66(40) \quad V = 64(40)$$

$$\Rightarrow V_{\text{out}} = \frac{66 \times 551}{127} = 66.551$$

$$\Rightarrow 551 = \frac{128}{64} (7F) + \frac{124}{64} (7C) + \frac{123}{64} (7B) + \frac{122}{64} (7A) + \frac{121}{64} (70)$$

$$V_{\text{out}} = 0 \quad 0 \quad 1 \quad 7F \quad 25(7F) \quad FE \quad FF$$

$$U_{\text{out}} = 127 \times \frac{06}{64} + 64 \times 551$$

$$= \frac{127 \times 06}{64} + 64 \times 551$$

$$= FF \quad FE \quad FC \quad 81 \quad 7 \quad 6 \quad 3$$

① For 40

$$U_{\text{out}} = 0 \quad 0 \quad 1 \quad 7F \quad FE \quad FE \quad FE \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

$$V_{\text{out}} = 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 1 \quad 7F \quad FC \quad FF \quad FF$$

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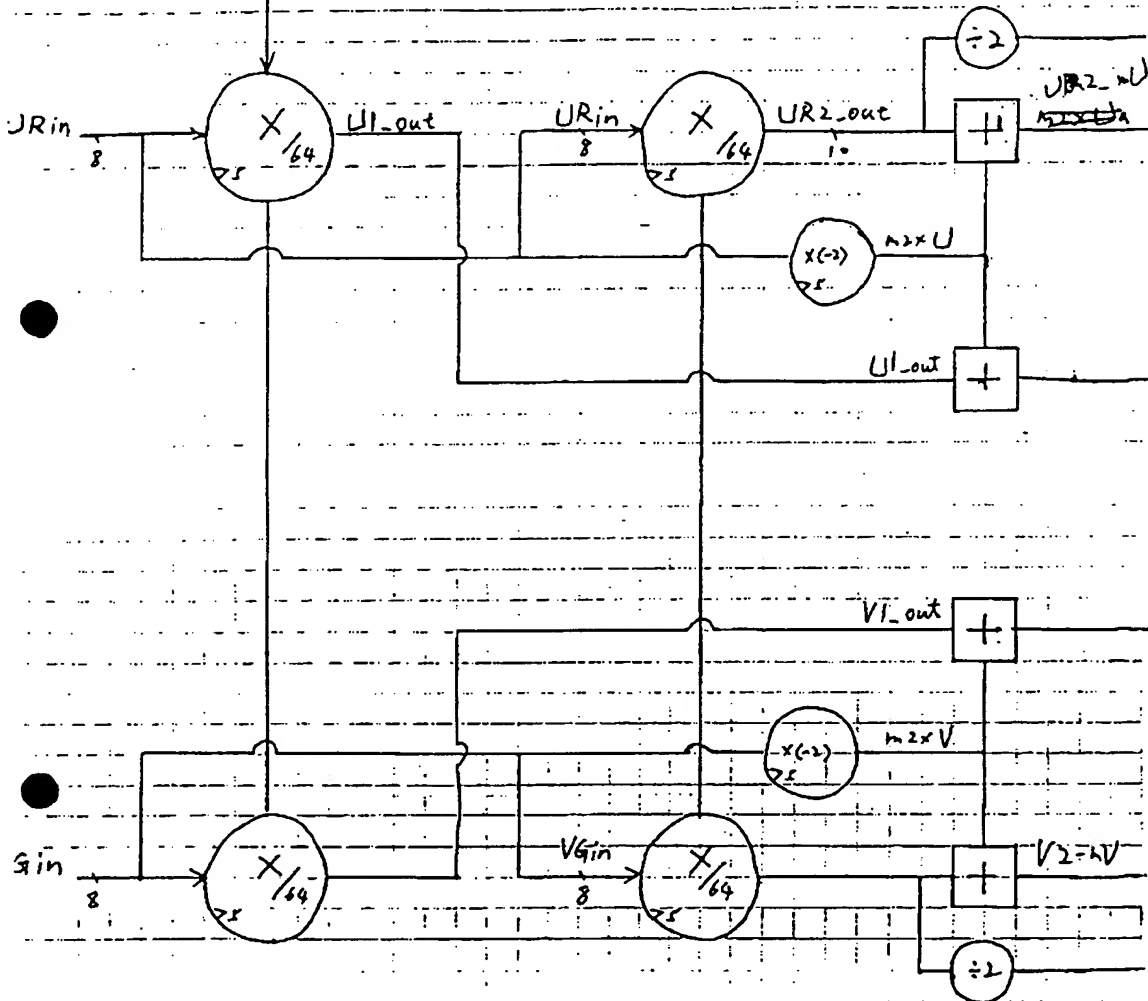
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17048
Subject: RGB - YUV Flow

sat_wshue

sat_sinhue



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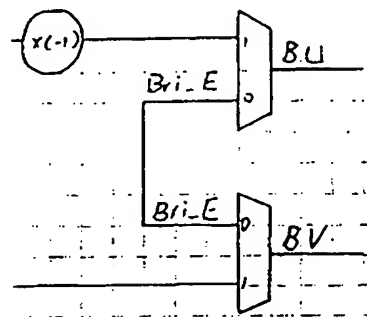
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UR3



V.G3

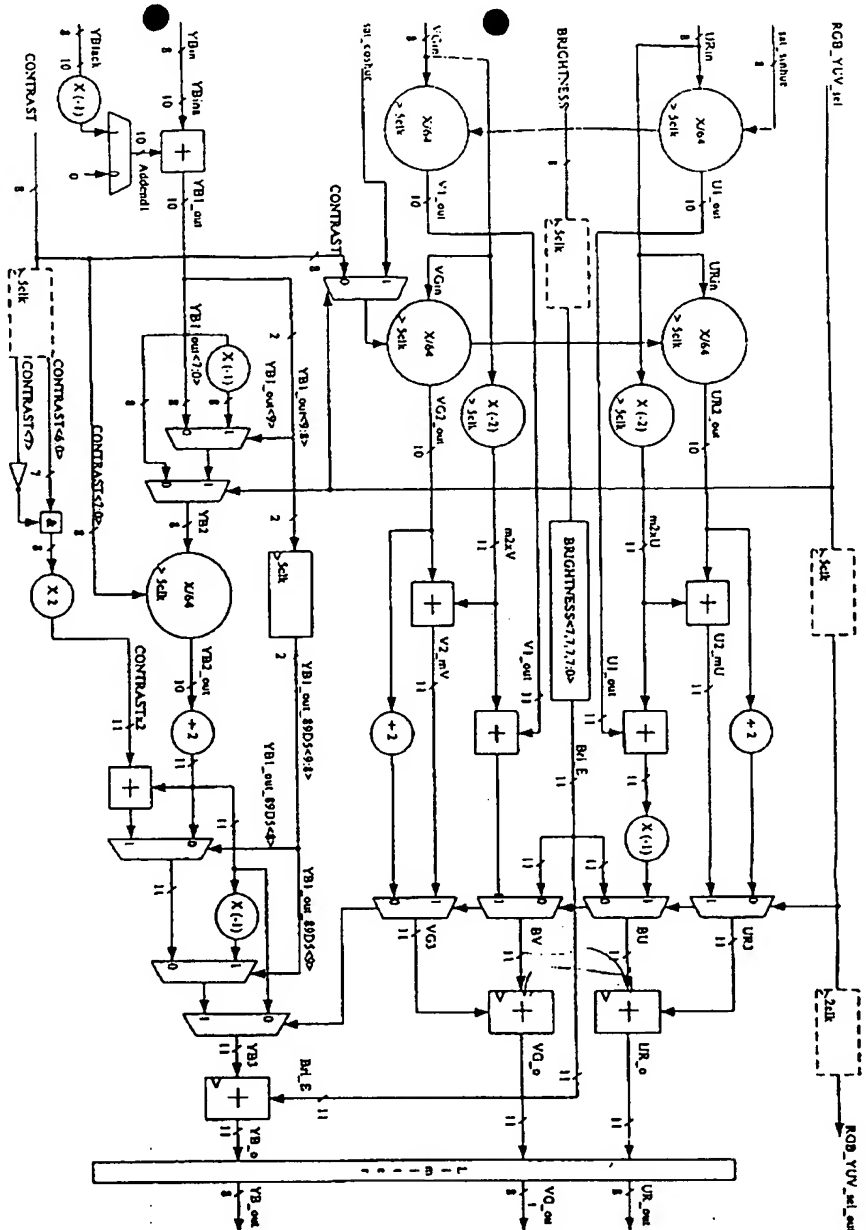
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17051



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Name	Date

Signature: h/17

Date: 10/14/15

Subject: Multiplier study目前的架構是正數 \times 正數 但可能可更改為正數 \times (正負數)

\uparrow \uparrow
 Multiplier Ain
 (原 CONTRAST)

原架構中已考慮到 Multiplier (CONTRAST) 隨此 delay 的 issue. 若 consider gate count, 在正 \times 正情形下,

● 可把 CONTRAST 的 delay 拿掉

若要改為 (正負) \times (正), 將原架構中需要增加位數之 MSB 皆填上原數之 MSB 值

例如: $B = PN \times 4 = PN(87) \& PK(?)$ 為 $PN(7,0)$

試看看

$\pm A \rightarrow PN$

\Rightarrow 補數時

~~$PN = NOT(A) + 1$~~
 ~~$A = PN$~~

$B \rightarrow P$

$A = PN \Rightarrow$

$+A = NOT(0) + 1$
 $NOT(PN) + 1$

$\pm S \rightarrow OUTPUT$

$S = OUT \Rightarrow$

$+S = NOT(OUT) + 1$

根據 simulation 的結果, it seems o.k.

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2000/4/17

$$P = 23 \quad PN = -1 \Rightarrow \text{op1 2 3 6 的 乘积 是}$$

$$\Rightarrow X \div 64 = 3FE = 11,111,111 = -1$$

$$P = 23 (17) \quad PN = -40 - 64 (0C0) \Rightarrow 3E9 (=23 DEC -17 HEX)$$

$$P = 23 \Rightarrow P = 1011$$

$$P = 1110111 \Rightarrow 247 (F7) \quad PN = -64 (C0) \Rightarrow 309$$

$$X \div 64 = 309 \Rightarrow F7 \text{ 的 乘数}$$

$$CPN_{d3} = PN \times P<7,6> + \underbrace{PN<7> \times 2^{10}}_{\text{29}} \times P<1,6> \\ + \underbrace{PN<7> \times 2^{10}}_{\text{10}}$$

$$CPN_{d2d} = PN<7,7> \times 2 \times P<7,7> + PN<7,7> \times 2 \times P<6>$$

$$= PN<7> \times P<7,6> + PN<7> \times 2^{10} \times P<7>$$

$$+ PN<7> \times 11 \times 2^{10} \times P<6>$$

$$= PN \times P<7,6> + PN<7> \times 512 \times P<7> + PN<7> \times 11 \times 2^{10} \times P<6>$$

$$\hookrightarrow PN<7> = 0 \Rightarrow 0$$

$$PN<7> = 1 \Rightarrow 1 \times 512 \times P<7> + 2^2 \times 256 \times P<6>$$

$$\Rightarrow 2 \times 256 \times P<7> + 2^3 \times 256 \times P<6>$$

$$\Rightarrow PN<7> \times 256 \times P<7,6> + PN<7> \times 256 \times P<6>$$

$$\Rightarrow PN<7> \times 256 \times (P<7,6> + 2 \times P<6>)$$

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Date: 2020/4/10

17054

Subject: _____

$$\begin{aligned}
 & PN \times 2^{P<7:6>} + PN<7> \times 2^{12} \times (P<7:6> + P<6>) \\
 & + \frac{PN<7> \times 7 \times 2^6 \times P<5>}{N} \times P<5> \\
 & + PN \times P<7:6:5> + PN<7> \times 2^6 \times [2P<7:6> + 4P<6> + 7P<5>] \\
 & = PN \times P<7:6:5> + PN<7> \times 2^6 \times [P<7:5> + 2P<6:5> + 4P<5>] \\
 & \quad [4P<7> + 6P<6> + 7P<5>]
 \end{aligned}$$

$$\begin{aligned}
 & 23 \times (-128) = 17 \times 80 \\
 & 11 \times 2578 = 680 = 0110, 1000, 0000 = \text{the 1st number}
 \end{aligned}$$

$$\begin{aligned}
 & 23 \times (-128) = 17 \times 80 \Rightarrow 16480 \text{ (Hex)} \\
 & \text{the 2nd number} = 87F11 = 880 \\
 & = 1011, 1000, 0000 \\
 & \Rightarrow \text{the 3rd number} = 295
 \end{aligned}$$

$$\begin{aligned}
 & 23 \times (-128) = 17 \times 80 = 680 \text{ (Hex)} = 0110, 1000, 0000 \\
 & (147F) = 180 \text{ the 2nd number} = 354
 \end{aligned}$$

$$\begin{aligned}
 & 23 \times (-128) = 17 \times 80 = 1,011 \times 1,000, 0000 \\
 & = 1011, 1000, 0000 \\
 & = 8880 = 480 \text{ the 3rd number} = 1452
 \end{aligned}$$

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Name _____	Date _____	Date: <u>2000/4/2</u>

5 bits		5 bits	
00001 → 1		10011 → 25	16+8+1 32-8+1
00010 → 2		10010 → 26	16+8+2 32-8+2
00011 → 3	1+2 4+1	10011 → 27	32-4-1
00100 → 4	4	10100 → 28	32-4
00101 → 5	4+1	10101 → 29	32-4+1
00110 → 6	4+2 8-2	10110 → 30	32-2
00111 → 7	8-1	10111 → 31	32-1
01000 → 8	8		32-1
01001 → 9	8+1 4+4+1 16-8+1		0
01010 → 10	8+2 4+4+2 16-8+2		
01011 → 11	16-4-1		
01100 → 12	16-4	较小的数不可超过 8 1/2 overflow	
01101 → 13	16-4+1		
01110 → 14	16-2	Op1 = 1 2 3 4 5 6 7 8	
01111 → 15	16-1		
10000 → 16	16	Op2 = 4 8 -8 -4	
10001 → 17	16+1		
10010 → 18	16+2	Op4 = 16 32	
10011 → 19	16+2+1 16+4-1		
10100 → 20	16+4	Op = +1 (Op1)	
10101 → 21	16+4+1		
10110 → 22	16+4+2 16+8-2	Op = - (Op1)	
10111 → 23	16+8-1		
11000 → 24	16+8 32-8	Op = +2 (Op1)	
		Op = -2 (Op1)	
		Op = +4 (Op2)	
		Op = -4 (Op2)	
		Op = +8 (Op3)	
		Op = -8 (Op3)	
		Op = 16 (Op4)	

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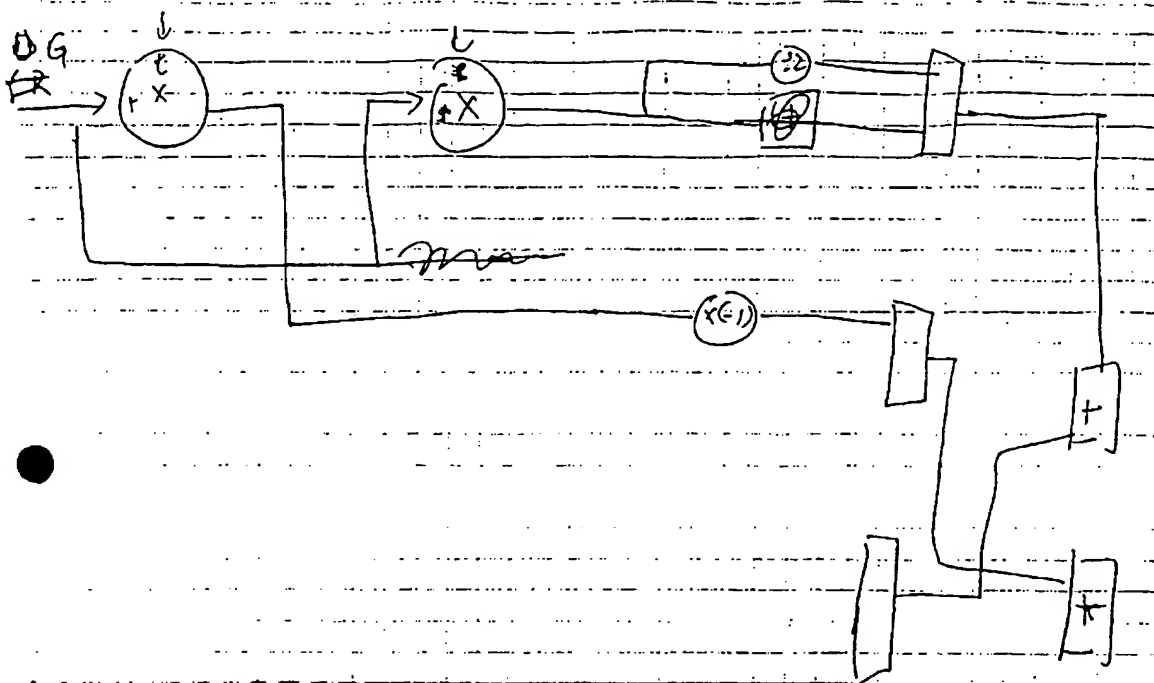
Name _____ Date _____

Name _____ Date _____

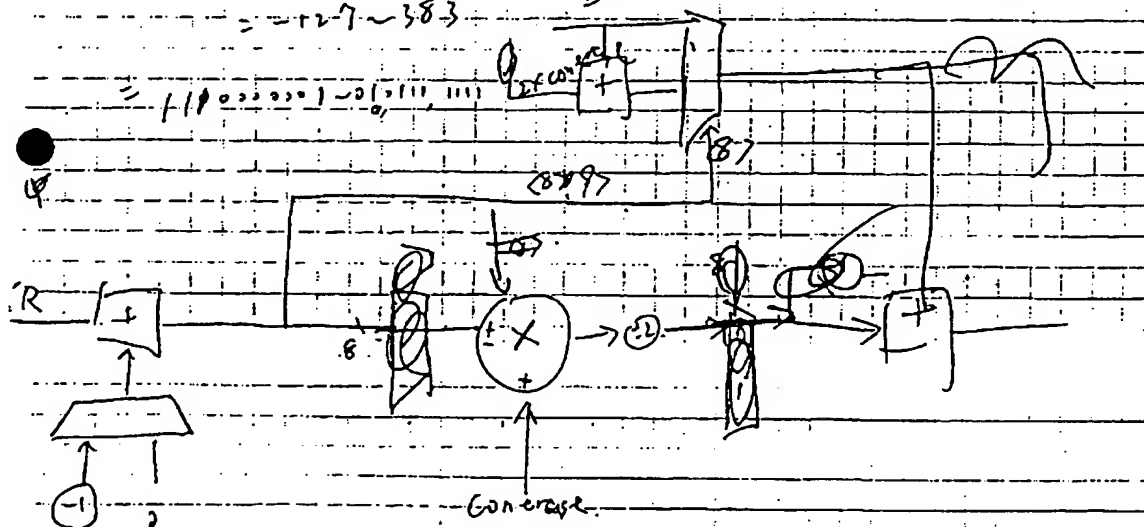
Signature: blqir

Date: 2000/4/10

17056 YUV - RGB
Subject: convert under new designed PNXP/64



$$Y - Y_{Block} = 0.22x = (129 - (-118)) = 11 + 0.07 \cdot 11 + 128.9 \cdot 0.07 = 12.7 \sim 13$$



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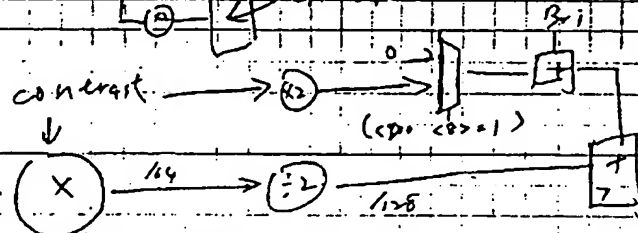
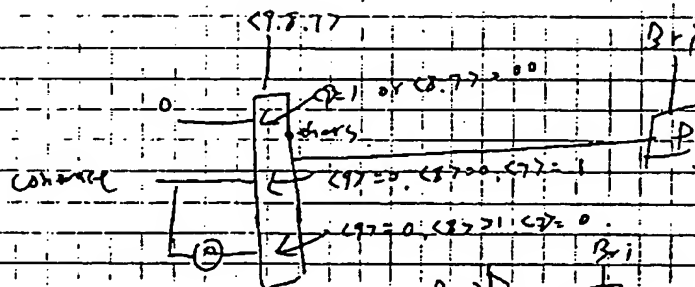
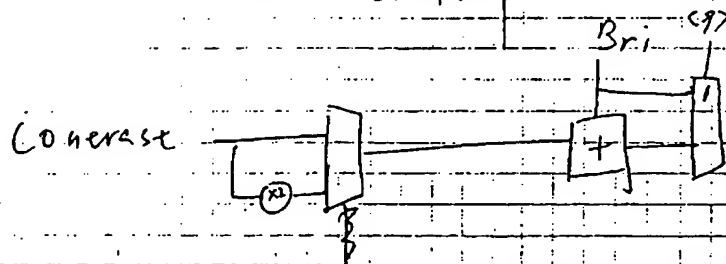
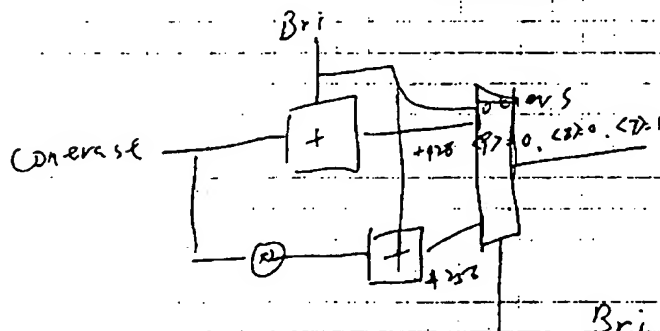
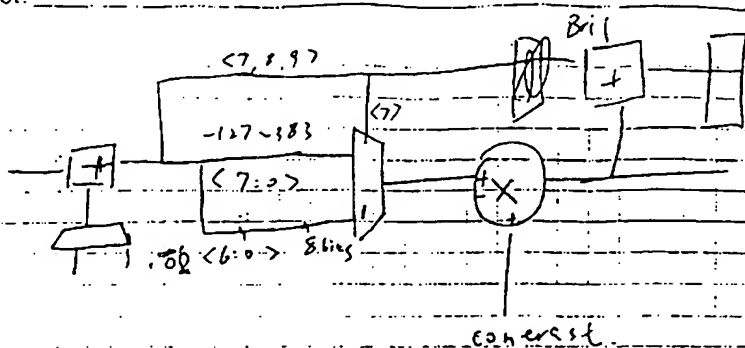
Name	Date
Name	Date

Signature: blair

Date: 2000/4/21

Subject: _____

17057



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Name _____ Date _____

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Date: 2003/4/12

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000518

Subject: Multiplication

17059



for PN inputs reduce to DFFs
for P inputs reduce to DFFs

is replaced in functionally

is replaced in functionally

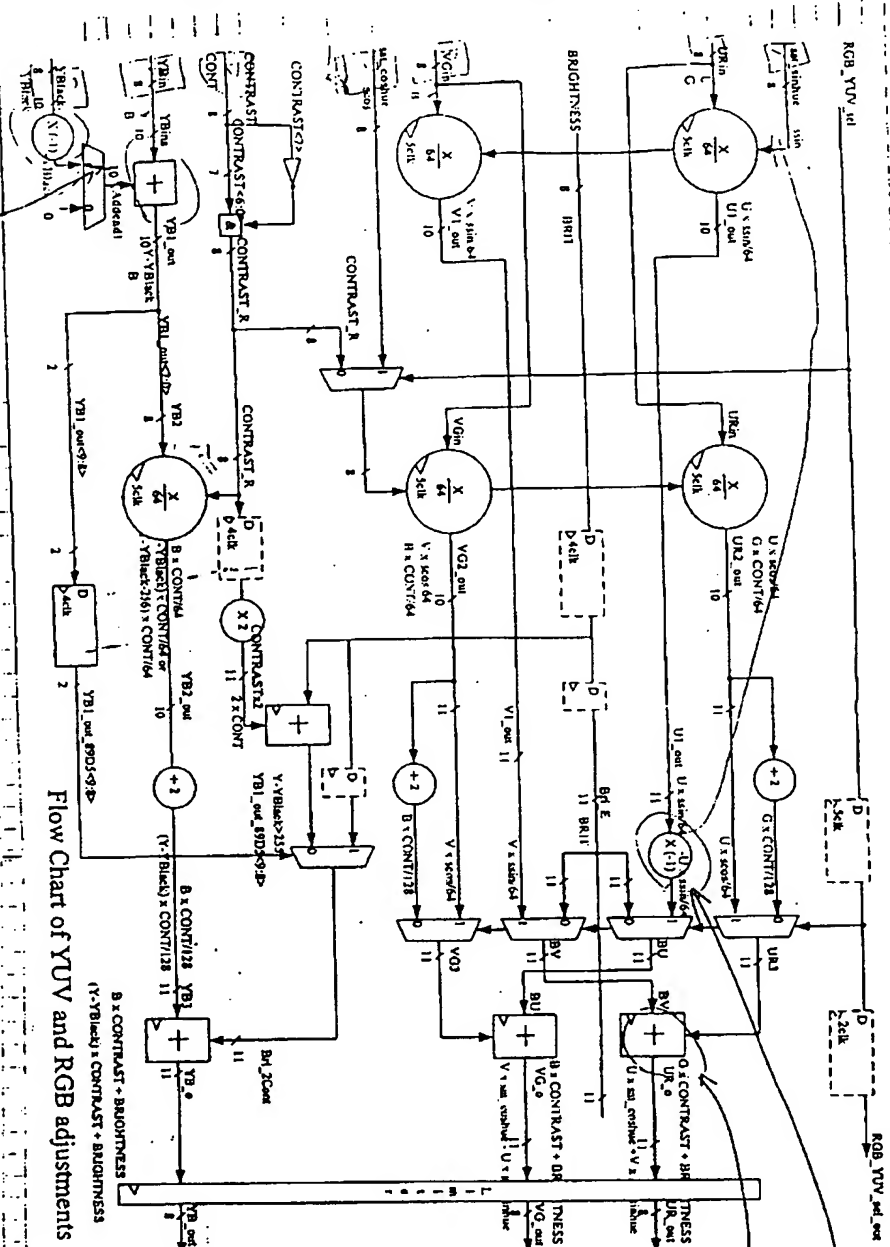
Name	Date
Name	Date

Name	Date
Name	Date

Subject: 170C0 Delay issue of YUV adjustments

Subject:

0289061



Flow Chart of YUV and RGB adjustments

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Signature: b/a/v
 Date: 10/14/12

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Signature: b/a/v
 Date: 10/14/12

Subject: 17062 complement signal in new designed multiplier

Subject: _____

17063

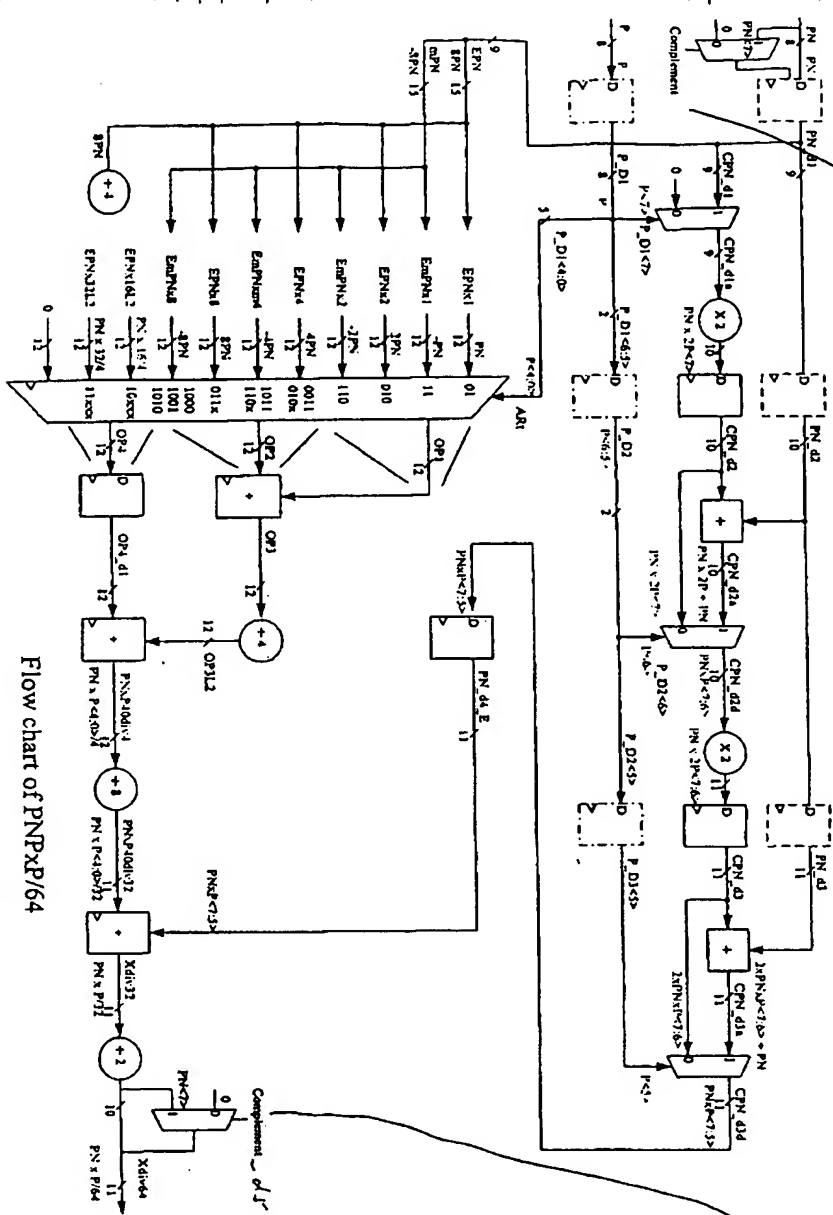
complement use delay cells



in order to match

the output of the complement controlled mux

By the way DFFs can be removed if complement is ready hardly very with time



Flow chart of PNPxP/64

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Date: 2009/4/15

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Name _____
Date _____

Signature: L/1/1
Date: 2009/4/15

17004

subject: Testing RGB code

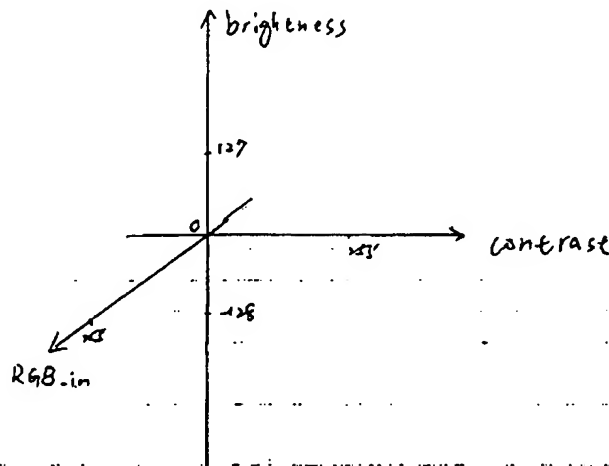
$$RGB_{out} = RGB_{in} \times contrast + brightness$$

$$RGB_{in} : 0(00) \sim 255(FF)$$

$$RGB_{out} : 0(00) \sim 255(FF)$$

$$contrast : 0(80) \sim \frac{127}{128}(FF), \frac{128}{128}(00) \sim \frac{255}{128}(7F)$$

$$brightness : -128(80) \sim -1(FF), 0(00) \sim 127(7F)$$



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Name

Date

Date: 2000/9/14

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000522

Subject: de-interlace testing

17005

File: D:\projects\Scaler\Oslo\deinterlace\deint.vhd1 2000/3/30, 11:37:56AM

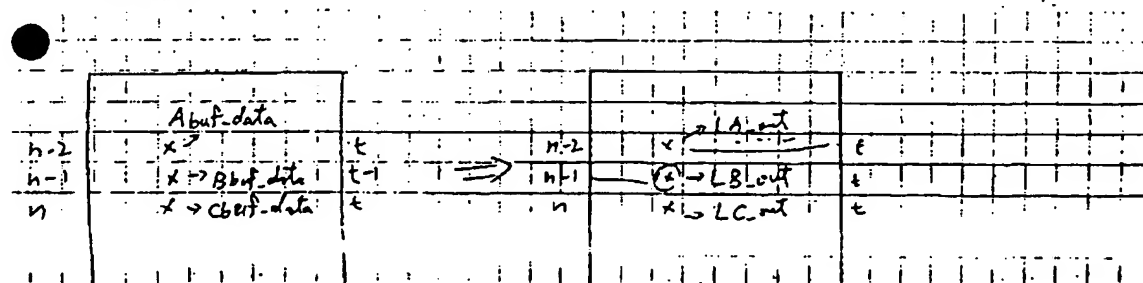
```
LIBRARY ieee;
USE ieee.std_logic_1164.all;
USE ieee.std_logic_unsigned.all;

-- Gene Chuang, Mar 30, 2000, trumpion use
-- name: deint.vhd1 (deinterlacing circuit for video)

-- input: Abuf_data (n-2 Frame t)          output: LA_out (n-2 Frame t)
--         Bbuf_data (n-1 Frame t-1)       LB_out (n-1 Frame t)
--         Cbuf_data (n Frame t)           LC_out (n Frame t)

-- The deinterlacing ckt generates the 3 lines (n-2, n-1, n) for scaler
-- conversion.
-- There are 3x3 pixels for motion detection and I to Progressive
-- conversion,
-- namely,
-- p1 = RGB(pA,delay1); p2 = RGB(pA,delay2); p3 = RGB(pA,delay3);
-- p4 = RGB(pB,delay1); p5 = RGB(pB,delay2); p6 = RGB(pB,delay3);
-- p7 = RGB(pC,delay1); p8 = RGB(pC,delay2); p9 = RGB(pC,delay3);
--
-- (Diff81+Diff86 && Diff82+Diff83 && Diff83-Diff84 > THDMotion) means
-- Motion
--
-- Motion: if (Diff82+Diff83 < Diff81+Diff86 && Diff82-Diff83 <
-- Diff83-Diff84)
-- then the result is the averaged of pixel2 and 5.
-- Stationary: the result is from the previous field (F t-1).
--
-- Since PH_active (or swap_hs), powerdown, and PV_active are not used, to
-- save
-- power, the input is set to zero during display disable period.

ENTITY deint IS
PORT (
    rstn          : in std_logic;
    powerdown     : in std_logic;
    clk           : in std_logic;
    pv_active     : in std_logic;
    swap_hs       : in std_logic;
    abuf_data      : in std_logic_vector(23 downto 0);
    bbuf_data      : in std_logic_vector(23 downto 0);
    cbuf_data      : in std_logic_vector(23 downto 0);
    THDMotion      : in std_logic_vector(7 downto 0);
    LA_out         : out std_logic_vector(23 downto 0);
    LB_out         : out std_logic_vector(23 downto 0);
    LC_out         : out std_logic_vector(23 downto 0);
);
END deint;
```



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Signature: blair

Date: 2000/4/15

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000523

17066
Subject: PPM to RGB code study

FPM code format: 7 PS P6

P_3

\downarrow

P_2

P_6

\downarrow

P_5

width High color max

width width width

Line 1 $rs^h rs^h rs^b$ →

3 →

c →

1 →

● — 花

$(x = 0 \sim \text{LSV})$
 $\hookrightarrow (y = 0 \sim \text{LSV})$
 $(n = 0 \sim 2)$
 $\text{rgb} = \text{rgbarray}(x) [y] [n]$

~~\Rightarrow stack k:k~~

改同 讀三行 書三行 字三行

~~1.1 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7.0 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9.0 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 10.0 10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 11.0 11.1 11.2 11.3 11.4 11.5 11.6 11.7 11.8 11.9 12.0 12.1 12.2 12.3 12.4 12.5 12.6 12.7 12.8 12.9 13.0 13.1 13.2 13.3 13.4 13.5 13.6 13.7 13.8 13.9 14.0 14.1 14.2 14.3 14.4 14.5 14.6 14.7 14.8 14.9 15.0 15.1 15.2 15.3 15.4 15.5 15.6 15.7 15.8 15.9 16.0 16.1 16.2 16.3 16.4 16.5 16.6 16.7 16.8 16.9 17.0 17.1 17.2 17.3 17.4 17.5 17.6 17.7 17.8 17.9 18.0 18.1 18.2 18.3 18.4 18.5 18.6 18.7 18.8 18.9 19.0 19.1 19.2 19.3 19.4 19.5 19.6 19.7 19.8 19.9 20.0 20.1 20.2 20.3 20.4 20.5 20.6 20.7 20.8 20.9 21.0 21.1 21.2 21.3 21.4 21.5 21.6 21.7 21.8 21.9 22.0 22.1 22.2 22.3 22.4 22.5 22.6 22.7 22.8 22.9 23.0 23.1 23.2 23.3 23.4 23.5 23.6 23.7 23.8 23.9 24.0 24.1 24.2 24.3 24.4 24.5 24.6 24.7 24.8 24.9 25.0 25.1 25.2 25.3 25.4 25.5 25.6 25.7 25.8 25.9 26.0 26.1 26.2 26.3 26.4 26.5 26.6 26.7 26.8 26.9 27.0 27.1 27.2 27.3 27.4 27.5 27.6 27.7 27.8 27.9 28.0 28.1 28.2 28.3 28.4 28.5 28.6 28.7 28.8 28.9 29.0 29.1 29.2 29.3 29.4 29.5 29.6 29.7 29.8 29.9 30.0 30.1 30.2 30.3 30.4 30.5 30.6 30.7 30.8 30.9 31.0 31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8 31.9 32.0 32.1 32.2 32.3 32.4 32.5 32.6 32.7 32.8 32.9 33.0 33.1 33.2 33.3 33.4 33.5 33.6 33.7 33.8 33.9 34.0 34.1 34.2 34.3 34.4 34.5 34.6 34.7 34.8 34.9 35.0 35.1 35.2 35.3 35.4 35.5 35.6 35.7 35.8 35.9 36.0 36.1 36.2 36.3 36.4 36.5 36.6 36.7 36.8 36.9 37.0 37.1 37.2 37.3 37.4 37.5 37.6 37.7 37.8 37.9 38.0 38.1 38.2 38.3 38.4 38.5 38.6 38.7 38.8 38.9 39.0 39.1 39.2 39.3 39.4 39.5 39.6 39.7 39.8 39.9 40.0 40.1 40.2 40.3 40.4 40.5 40.6 40.7 40.8 40.9 41.0 41.1 41.2 41.3 41.4 41.5 41.6 41.7 41.8 41.9 42.0 42.1 42.2 42.3 42.4 42.5 42.6 42.7 42.8 42.9 43.0 43.1 43.2 43.3 43.4 43.5 43.6 43.7 43.8 43.9 44.0 44.1 44.2 44.3 44.4 44.5 44.6 44.7 44.8 44.9 45.0 45.1 45.2 45.3 45.4 45.5 45.6 45.7 45.8 45.9 46.0 46.1 46.2 46.3 46.4 46.5 46.6 46.7 46.8 46.9 47.0 47.1 47.2 47.3 47.4 47.5 47.6 47.7 47.8 47.9 48.0 48.1 48.2 48.3 48.4 48.5 48.6 48.7 48.8 48.9 49.0 49.1 49.2 49.3 49.4 49.5 49.6 49.7 49.8 49.9 50.0 50.1 50.2 50.3 50.4 50.5 50.6 50.7 50.8 50.9 51.0 51.1 51.2 51.3 51.4 51.5 51.6 51.7 51.8 51.9 52.0 52.1 52.2 52.3 52.4 52.5 52.6 52.7 52.8 52.9 53.0 53.1 53.2 53.3 53.4 53.5 53.6 53.7 53.8 53.9 54.0 54.1 54.2 54.3 54.4 54.5 54.6 54.7 54.8 54.9 55.0 55.1 55.2 55.3 55.4 55.5 55.6 55.7 55.8 55.9 56.0 56.1 56.2 56.3 56.4 56.5 56.6 56.7 56.8 56.9 57.0 57.1 57.2 57.3 57.4 57.5 57.6 57.7 57.8 57.9 58.0 58.1 58.2 58.3 58.4 58.5 58.6 58.7 58.8 58.9 59.0 59.1 59.2 59.3 59.4 59.5 59.6 59.7 59.8 59.9 60.0 60.1 60.2 60.3 60.4 60.5 60.6 60.7 60.8 60.9 61.0 61.1 61.2 61.3 61.4 61.5 61.6 61.7 61.8 61.9 62.0 62.1 62.2 62.3 62.4 62.5 62.6 62.7 62.8 62.9 63.0 63.1 63.2 63.3 63.4 63.5 63.6 63.7 63.8 63.9 64.0 64.1 64.2 64.3 64.4 64.5 64.6 64.7 64.8 64.9 65.0 65.1 65.2 65.3 65.4 65.5 65.6 65.7 65.8 65.9 66.0 66.1 66.2 66.3 66.4 66.5 66.6 66.7 66.8 66.9 67.0 67.1 67.2 67.3 67.4 67.5 67.6 67.7 67.8 67.9 68.0 68.1 68.2 68.3 68.4 68.5 68.6 68.7 68.8 68.9 69.0 69.1 69.2 69.3 69.4 69.5 69.6 69.7 69.8 69.9 70.0 70.1 70.2 70.3 70.4 70.5 70.6 70.7 70.8 70.9 71.0 71.1 71.2 71.3 71.4 71.5 71.6 71.7 71.8 71.9 72.0 72.1 72.2 72.3 72.4 72.5 72.6 72.7 72.8 72.9 73.0 73.1 73.2 73.3 73.4 73.5 73.6 73.7 73.8 73.9 74.0 74.1 74.2 74.3 74.4 74.5 74.6 74.7 74.8 74.9 75.0 75.1 75.2 75.3 75.4 75.5 75.6 75.7 75.8 75.9 76.0 76.1 76.2 76.3 76.4 76.5 76.6 76.7 76.8 76.9 77.0 77.1 77.2 77.3 77.4 77.5 77.6 77.7 77.8 77.9 78.0 78.1 78.2 78.3 78.4 78.5 78.6 78.7 78.8 78.9 79.0 79.1 79.2 79.3 79.4 79.5 79.6 79.7 79.8 79.9 80.0 80.1 80.2 80.3 80.4 80.5 80.6 80.7 80.8 80.9 81.0 81.1 81.2 81.3 81.4 81.5 81.6 81.7 81.8 81.9 82.0 82.1 82.2 82.3 82.4 82.5 82.6 82.7 82.8 82.9 83.0 83.1 83.2 83.3 83.4 83.5 83.6 83.7 83.8 83.9 84.0 84.1 84.2 84.3 84.4 84.5 84.6 84.7 84.8~~

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Name	Date
Name	Date

Signature: h/r/v
Date: 10/4/16

Subject: Modelsim lib compile method

17067

modelsim

vlib -oslo lib

vcom -work oslo-lib -xuh

Modelsim ini lib (if to)

deint delay clock

abuf_data → pixel1 → 2 → 3 → pixel3_Ra → diff8Lp
[D] [D] [B] [D]

→ abs diff 8L-R → diff 8L-R → diff 3.84-RG → diff 8Lp
[B] [B] [B]

mux
→ diff 3.84 - is small as E → which direction → deint pixel 8
[B] [B]

→ LIB out

delay 9 clks $(t-1) + 9$

A.C delay 8 clks $t + 9$

Is closed To And Understood By Me

Name

Date

Signature: Blair

Name

Date

Date: 2010/4/26

17068

Subject: inverlce ppm file to RGB wte

```

/*
file : 3line-column.c
which is modified from p2vc.c by GS Huang, which was modified from
ppm2rgb.c
Program : ppm file format to ckt deint.tb.vhdl sim readable
By: Chen, Blair Jian-Tin, Apr 25, 2000
*/

/*
file : ppm2rgb.c
which is modified from s4p3.c
Program : ppm file format to ckt sim readable
By: Chuang, Gene Chun-Haiung, Jun 19
*/

#include <stdio.h>
#include <math.h>
#include <string.h>
#include <stdlib.h>

#define PMP3 1 /* PPM picture format is P3 */
#define PMP6 0 /* PPM picture format is P6 */

main()
{
FILE *fp; /* fpts */
int p3_p6, inpicture, outpicture;
int x,y,z;
int hi,wi, colormax;
unsigned char sr, gg, bb;
int irr, igg, ibb;
char str[30];
int inV_active, inM_active;
unsigned char RGBarray[1920][3][3];
unsigned char rrr, ggg, bbb;
int xl, yl;

setbuf(stdout, NULL);

printf("Input picture is\n");
0:compa(VGA), 1:textvga, 2:textSVGA, 3:textXGA, 4:VGAtestp\n");
printf("or 5:KGAtest, 6:GeneSVGA, 7:GeneXGA, 8:WStestp(1152*864), 9:SGAtestp\n");
printf("or 10:SVGAtestp, 11:Ingrid(720*576), 12:FS_XGA, 13:HS_XGA\n");
printf("or\n");
14:1280x960, 15:1600, 16:1920X1080, 17:1920X1200, 18:novashop, 19:zebraSVGA\n");
scanf("%d", &inpicture);

switch (inpicture) {
case 0:
fpi = fopen ("compa.ppm", "r");
inM_active = 640;
inV_active = 480;
break;
case 1:
fpi = fopen ("textvga.ppm", "r");
inM_active = 640;
inV_active = 480;
break;
case 2:
fpi = fopen ("textSVGA.ppm", "r");
inM_active = 800;
inV_active = 600;
break;
case 3:
fpi = fopen ("textXGA.ppm", "r");
inM_active = 1024;
inV_active = 768;
break;
case 4:
fpi = fopen ("VGAtestp.ppm", "r");
inM_active = 640;
inV_active = 480;
break;
case 5:
fpi = fopen ("KGAtest.ppm", "r");
inM_active = 1024;
inV_active = 768;
break;
case 6:
fpi = fopen ("GeneSVGA.ppm", "r");
inM_active = 800;
inV_active = 600;
break;
case 7:
fpi = fopen ("GeneXGA.ppm", "r");
inM_active = 1024;
inV_active = 768;
break;
}
}

```

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_____ Name	_____ Date
_____ Name	_____ Date

Signature: blair
Date: 2/2/01

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000526

Subject: _____

97079

File: D:\projects\Scaler\Oslo\deinterlace\Modify\C\3line-column.C 2000/4/26, 05
:52:08PM

```
        break;
    case 8:
        fpi = fopen ("WStestp.ppm", "r");
        inH_active = 1152;
        inV_active = 864;
        break;
    case 9:
        fpi = fopen ("SXGAtestp.ppm", "r");
        inH_active = 1280;
        inV_active = 1024;
        break;
    case 10:
        fpi = fopen ("SVGAtestp.ppm", "r");
        inH_active = 800;
        inV_active = 600;
        break;
    case 11:
        fpi = fopen ("Ingrid.ppm", "r");
        inH_active = 720;
        inV_active = 576;
        break;
    case 12:
        fpi = fopen ("FS_XGA.ppm", "r");
        inH_active = 1024;
        inV_active = 768;
        break;
    case 13:
        fpi = fopen ("HS_XGA.ppm", "r");
        inH_active = 512;
        inV_active = 768;
        break;
    case 14:
        fpi = fopen ("1280x960.ppm", "r");
        inH_active = 1280;
        inV_active = 960;
        break;
    case 15:
        fpi = fopen ("1600.ppm", "r");
        inH_active = 1600;
        inV_active = 1280;
        break;
    case 16:
        fpi = fopen ("1920x1080.ppm", "r");
        inH_active = 1920;
        inV_active = 1080;
        break;
    case 17:
        fpi = fopen ("1920x1200.ppm", "r");
        inH_active = 1920;
        inV_active = 1200;
        break;
    case 18:
        fpi = fopen ("novashop.ppm", "r");
        inH_active = 720;
        inV_active = 480;
        break;
    case 19:
        fpi = fopen ("zebraSVGA.ppm", "r");
        inH_active = 800;
        inV_active = 600;
        break;
    default:
        fpi = fopen ("VGAtestp.ppm", "r");
        inH_active = 640;
        inV_active = 480;
        break;
}

printf("Output port no.: 1:one port, 2:two port, 3:three port\n");
scanf("%d",&outputport);

    if (fpi == (FILE *) NULL)
    {
        printf("Couldn't open the input file\n");
        exit(1);
    }
    fpo = fopen ("testp.rgb", "w");
    printf("The output file is contents rr gg bb <cr>\n", "testp.rgb");
    if (fpo == (FILE *) NULL)
    {
        printf("Couldn't open %s for writing. \n", "testp.rgb");
        exit(0);
    }

/* Read ppm file's headers and write them to out file*/
fscanf(fpi,"%s",str); printf("%s\n",str);
```

Disclosed To And Understood By Me

Name	Date
Name	Date

Signature: blair

Date: 2/24/01

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000527

Subject: _____

File: D:\projects\Scaler\Qs10\deinterlace\Modify\311ne-column.C 2000/4/26, 03:52:08PM

```
if (strcmp(str, "P6") == 0) {
    p3_p6n = PMP6;
    printf("The input %s file will be converted to P3 ppm\n", str);
} else { p3_p6n = PMP3; }

fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);
fscanf(fp1, "%s", str); printf("%s", str);

if (p3_p6n == PMP6) {
    fscanf(fp1, "%s", str); printf("%s\n", str);
}

fscanf(fp1, "%d %d", &w1, &h1);
printf("Original picture dimension: Width=%d, Height=%d \n", w1, h1);

fscanf(fp1, "%d\n", &colormax);
printf("color value max = %d \n", colormax);

/* get RGB data for a pixel from the ppm file */
for (y=0; y< h1; y++) {
    for (x=0; x< w1; x++) {
        if (p3_p6n == PMP6) fscanf(fp1, "%c%c%c", &rr, &gg, &bb);
        else {
            fscanf(fp1, "%d%d%d", &rr, &gg, &bb);
            rr = rr/255; gg = gg/255; bb = bb/255;
        }

        if (y == 0) {
            RGBarray[x][0][0] = rr;
            RGBarray[x][0][1] = gg;
            RGBarray[x][0][2] = bb;
        } else if ((y%2) == 1) {
            RGBarray[x][1][0] = rr;
            RGBarray[x][1][1] = gg;
            RGBarray[x][1][2] = bb;
        } else {
            RGBarray[x][2][0] = rr;
            RGBarray[x][2][1] = gg;
            RGBarray[x][2][2] = bb;
        }
    }
}

if ((y>0) && ((y%2) == 0))
for (x1=0; x1< w1; x1++) {
    for (y1=0; y1<3; y1++) {
        rro = RGBarray[x1][y1][0];
        ggo = RGBarray[x1][y1][1];
        bbo = RGBarray[x1][y1][2];

        if (outputport == 1)
            fprintf(fpo, "%02x %02x %02x\n", rro, ggo, bbo);
        else if (outputport == 2)
        {
            j=x1%2;
            if (j==1) fprintf(fpo, "%02x %02x\n", rro, ggo, bbo);
            else fprintf(fpo, "%02x %02x %02x ", rro, ggo, bbo);
        }
        else {
            if (y1==2) fprintf(fpo, "%02x %02x\n", rro, ggo, bbo);
            else fprintf(fpo, "%02x %02x %02x ", rro, ggo, bbo);
        }
    }

    RGBarray[x1][0][0] = RGBarray[x1][2][0];
    RGBarray[x1][0][1] = RGBarray[x1][2][1];
    RGBarray[x1][0][2] = RGBarray[x1][2][2];
}
```

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Name _____ Date _____

Signature: Chair

Name _____ Date _____

Date: 2000/4/26

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000528

Subject: _____

17071

File: O:\projects\Scaler\Oslo\deinterlace\Modify\c\3line-column.C 2000/4/26, 05
:52:08PM

```

)

printf("The output file is %s which contents rearranged rr gg bb <cr>\n",
"testp.rgb");

fclose(fp1);
fclose(fp0);

/* END OF main -/

```

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Name Date

Signature: blair

Name Date

Date: 2000/4/26

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

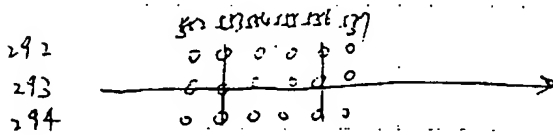
TR000529

17072

Subject: Debug for de-interlaced

頭 白點 (55, 23) (556, 233)

$$\rightarrow 293 \times 720 + 553 (556) = 211514 \text{th} \approx 211518 \text{th}$$



$$\Rightarrow 292 \times 720 + 553 \sim 558 = 210793 \sim 210798$$

$$293 \times 720 + 553 \sim 558 = 211513 \sim 211518$$

$$294 \times 720 + 553 \sim 558 = 212233 \sim 212238$$

Input 用 Uitermediate / Search / Word Count

line 294 ch 255, 246 208 255 247 209

293 ch 255 168 43 255 165 39

292 ch 252 25 255 255 255 255

output

line 294 ch 255 246 208 255 247 209

293 ch 255 150 35 255 147 31

292 ch 255 25 255 255 255 255

將 RGB 值納入

直接由 RGB 值取決

Disclosed To And Understood By Me

Name

Date

Signature:

6/1/17

Name

Date

Date:

2017/4/27

: 9) 及 第 293 行

$$\text{line} = \frac{292}{2} \times 720 + 553 \sim 558$$

$$= 105673 \sim 105678 \text{ 前面}$$

293 " 294 "

$$\text{line} = 105673 \sim 105678 \text{ 后面中间}$$

294 " 295 "

$$\text{line} = \frac{294}{2} \times 720 + 553 \sim 558$$

$$= 106393 \sim 106398 \text{ 或 292.93 两行中间}$$

(input)

input

552 553 554 555 556 557 558 559

line 292 24 19 38 02 21 24 01 11 11 12 18 28 10 24 24 20 29 29

293 03 ff ff cc ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff

294 23 16 36 0d 1f 15 08 1b 21 13 25 26 10 23 26 20 28 26

Output

552 553 554 555 556 557

line 292 24 19 38 02 21 24 01 11 11 12 18 28 10 24 24 20 29 29 → 同 input

293 23 16 36 0d 1f 15 08 1b 21 13 25 26 10 23 26 20 28 26

294 23 16 36 0d 1f 15 08 1b 21 13 25 26 10 23 26 20 28 26 → 同 input

同 input

同 input

point (53, 293): diff = 10 24 27 12 26 27 01 ff ff 4F9

⇒ 4F9 = 4F9, 两数相同尚未 decced 到

NOVA 在 THDuration = 20 时向可, 40 即开始出现错误

zebra 则更模糊

Disclosed To And Understood By Me

Name

Date

Signature: blair

Date:

2004/4/28

Name

Date

17074

Subject: RGB to PPM c code modifyFile: D:\projects\Scaler\Oslo\deinterlace\Modify\C\rgb2ppm.c 2000/4/28, 05:33:
42PM

```

.....
- translate scale.v output R,G,B 24 bits
- (output.txt) to 3 characters
.....

```

```

#include <stdio.h>
#include <math.h>
#include <string.h>
#include <stdlib.h>

```

```
main()
```

```

{
    FILE *fpo, *fpi;
    unsigned char *i12;
    int x,y;
    int sdwi=600;
    int sdhi=600;
    int tmp[2].cmpl;
    int i,j;
    int inpicture;

```

```

    char str[30];
    int RGBarray[5760];
    int k,l,m,nl;

```

```

    fpi = fopen("input.rgb", "r");
    if (fpi == (FILE *) NULL)
    {
        printf("Couldn't open the input file\n");
        exit(1);
    }

```

```

    fpo = fopen("output.ppm", "w");
    if (fpo == (FILE *) NULL)
    {
        printf("Couldn't open %s for writing. \n", "output.ppm");
        exit(0);
    }

```

```

    printf("The file output.txt is --
0:VGA,1:SVGA,2:XGA,3:1152x864,4:SXGA,5:720x576,6:720x480,7:special\n");
    scanf("%d", &inpicture);

```

```

    switch (inpicture) {
        case 0:
            sdwi=640;
            sdhi=480;
            break;
        case 1:
            sdwi=800;
            sdhi=600;
            break;
        case 2:
            sdwi=1024;
            sdhi=768;
            break;
        case 3:
            sdwi=1152;
            sdhi=864;
            break;
        case 4:
            sdwi=1280;
            sdhi=1024;
            break;
        case 5:
            sdwi=720;
            sdhi=576;
            break;
        case 6:
            sdwi=720;
            sdhi=480;
            break;
        case 7:
            printf("Width is \n",
            scanf("%d", &sdwi);
            printf("Height is \n",
            scanf("%d", &sdhi);
            break;
        default:
            sdwi=1024;
            sdhi=768;
            break;
    }

```

```

    fscanf(fpi, "%s\n", str);
    fscanf(fpi, "%s\n", str);
    fscanf(fpi, "%s\n", str);
    fscanf(fpi, "%s\n", str);

```

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Name _____ Date _____

Signature: blair

Name _____ Date _____

Date: 2000/4/28

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000532

Subject: _____

17075

File: D:\projects\Scaler\Oslo\deinterlace\Modify\C\rgb2ppm.c 2000/4/28, 05:33:42PM

```
fscanf(fpi, "%s\n", str);
fscanf(fpi, "%s\n", str);
fscanf(fpi, "%s\n", str);
fscanf(fpi, "%s\n", str);
fscanf(fpi, "%s\n", str);

/* write ppm file's headers to output.ppm */
fprintf(fpo, "P3\n");
fprintf(fpo, "# By: Gene Chuang trumpion ue+ (copy right)\n");
fprintf(fpo, "# %d\n", sdwi, sdhi);
fprintf(fpo, "255\n");

fprintf(fpo, "\n");

/* read in output.rgb and translate it into char */
for(y=0; y<sdhi; y++)
{
    l=0;

    for(x=0; x<sdwi; x++)
    {
        m=x%6;

        fscanf(fpi, "%c%c%c%c%c%c%c%c%c\n", &r[0], &r[1], &r[2], &r[3], &r[4], &r[5], &r[6], &r[7], &r[8], &r[9], &r[10], &r[11]);
        for(i=0; i<6; i++)
        {
            tmp[i]=r[i*2];
            tmp[i]=r[i*2-1];

            for(j=0; j<2; j++) {
                if(tmp[j]>=48 && tmp[j]<=57) tmp[j]=tmp[j]-48; /* char 0 - 9 */
                else if(tmp[j]>=97 && tmp[j]<=102) tmp[j]=tmp[j]-87; /* char a - z */
                else if(tmp[j]>=65 && tmp[j]<=70) tmp[j]=tmp[j]-55; /* char A - F */
                else tmp[j]=-1;
            }

            /* fprintf(fpo, "%s is %c%c, tmp is %d %d ", r[i*2], r[i*2-1], tmp[0], tmp[1]);

            tmp1=16*tmp[0] + tmp[1];

            if(i<3)
            {
                fprintf(fpo, "%03d ", tmp1);

                if((m==3) && (i==2))
                    fprintf(fpo, "\n");
            } else {

                RGBarray[i]= tmp1;
                l++;

                if ((x==(sdwi-1)) && (i==3))
                {
                    for (x1=0; x1<l; x1++)
                    {
                        fprintf(fpo, "%03d ", RGBarray[x1]);

                        k=x1%18;
                        if(k==17)
                            fprintf(fpo, "\n");
                    }
                }
            }

        }

    }

    fclose(fpi);
    fclose(fpo);

    printf("The output file is %s which contents de-interlaced ppm image<cr>\n", "output.ppm");
}
```

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_____	_____
Name	Date
_____	_____
Name	Date

Signature: Wair
Date: 2000/4/28

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000533

17076
Subject: deinterlace test bench

```
-----  
  
LIBRARY ieee ;  
LIBRARY oslo_lib ;  
  
USE std.textio.ALL ;  
USE ieee.std_logic_1164.ALL ;  
USE ieee.std_logic_arith.ALL ;  
  
USE oslo_lib.oslo_components_pkg.ALL ;  
USE oslo_lib.std_rw.ALL ;  
  
-- escalate ports -begin  
entity deint_tb is  
end deint_tb ;  
  
-- escalate ports -end  
  
ARCHITECTURE behav_tb OF deint_tb IS  
  
    CONSTANT clockperiod : time := 16 ns ;  
    CONSTANT tpd          : time := 1 ns ;  
  
    signal clk          : std_logic := '0' ;  
  
    signal rstn          : std_logic ;  
    signal powerdown     : std_logic ;  
    signal pv_active     : std_logic ;  
    signal swap_hs       : std_logic ;  
    signal abuf_data     : std_logic_vector(23 downto 0) ;  
    signal bbuf_data     : std_logic_vector(23 downto 0) ;  
    signal cbuf_data     : std_logic_vector(23 downto 0) ;  
    signal THDmotion     : std_logic_vector(7 downto 0) ;  
  
    signal LA_out        : std_logic_vector(23 downto 0) ;  
    signal LB_out        : std_logic_vector(23 downto 0) ;  
    signal LC_out        : std_logic_vector(23 downto 0) ;  
    signal finished      : std_logic := '0' ;  
  
    -- main output SIGNALs here  
  
    signal Aout_val      : std_logic_vector(23 downto 0) ;  
    signal Bout_val      : std_logic_vector(23 downto 0) ;  
    signal Cout_val      : std_logic_vector(23 downto 0) ;
```

Page: 1

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_____ Name	_____ Date	Signature: <u>blair</u>
_____ Name	_____ Date	Date: <u>2020/4/28</u>

Subject: _____

17077

D:\projects\Scaler\Oslo\deinterlace\Modify\simtest\proj_test\deint_tb\behav_t

BEGIN

dut: deint

PORT MAP(
 rstn,
 powerdown,
 clk,
 pv_active,
 swap_hs,
 abuf_data,
 bbuf_data,
 cbuf_data,
 THDmotion,
 LA_out,
 LB_out,
 LC_out
);

PROCESS

 -- textio input file and output file

 USE std.textio.ALL;

 constant INFILE: string := "d:\projects\ppm\testp.rgb";

 FILE finp : text IS IN INFILE;

 -- main input SIGNALs here

 VARIABLE Rin_vala : std_logic_vector(7 downto 0);

 VARIABLE Gin_vala : std_logic_vector(7 downto 0);

 VARIABLE Bin_vala : std_logic_vector(7 downto 0);

 VARIABLE Rin_valb : std_logic_vector(7 downto 0);

 VARIABLE Gin_valb : std_logic_vector(7 downto 0);

 VARIABLE Bin_valb : std_logic_vector(7 downto 0);

 VARIABLE Rin_valc : std_logic_vector(7 downto 0);

 VARIABLE Gin_valc : std_logic_vector(7 downto 0);

 VARIABLE Bin_valc : std_logic_vector(7 downto 0);

 VARIABLE li, lo : line;

 VARIABLE comment : boolean := false;

 VARIABLE ct : time;

 constant OUTFILE: string := "d:\projects\ppm\output.rgb";

 FILE fout : text IS out OUTFILE;

Disclosed To And Understood By Me

Name Date

Name Date

Signature: o/air

Date: 2001/4/28

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000535

17078
ubject: _____

```
BEGIN
  WAIT FOR 0 ns;
  WHILE NOT endfile(finp) LOOP
    mreadline(finp, li, comment);
    IF NOT comment THEN
      mread(li, Rin_vala, h);
      mread(li, Gin_vala, h);
      mread(li, Bin_vala, h);
      mread(li, Rin_valb, h);
      mread(li, Gin_valb, h);
      mread(li, Bin_valb, h);
      mread(li, Rin_valc, h);

      mread(li, Gin_valc, h);
      mread(li, Bin_valc, h);

      -- main input SIGNALs here

      abuf_data <= Rin_vala & Gin_vala & Bin_vala;
      bbuf_data <= Rin_valb & Gin_valb & Bin_valb;
      cbuf_data <= Rin_valc & Gin_valc & Bin_valc;

      END IF;

      Aout_val <= LA_out;
      Bout_val <= LB_out;
      Cout_val <= LC_out;

      mwrite(lo, Aout_val, right, 6, h);
      mwrite(lo, Bout_val, right, 6, h);
      writeline(fout, lo);

      wait for 1 * CLOCKPERIOD;

    END LOOP;
    WAIT;
  END PROCESS ;

process
begin
  clk <= '0';
  loop
    wait for (CLOCKPERIOD * 0.5);
    clk <= '1';
    wait for (CLOCKPERIOD * 0.5);
    clk <= '0';
  end loop;
  wait;
end process;
```

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_____ Name	_____ Date
_____ Name	_____ Date

Signature: *air*
Date: 2003/4/18

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000536

Subject: _____

17079

```
powerdown <= '0';  
swap_hs <= '0';  
  
THDmotion <= "00100000";  
  
rstn <= '1';  
pv_active <= '1';
```

.D behav_tb;

ge: 3

THDmotion 在 20 (H) 時，動態之 hornship

尚可得到滿意的結果

但靜態之 zebra 則呈現較模糊的情形

(如 21 觀照之)

但若以 1.1 則圖面線條較失真

水波紋較少，樹枝較模糊

但斑馬則看不大出來

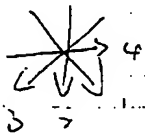
Disclosed To And Understood By Me

_____ Name	_____ Date
_____ Name	_____ Date

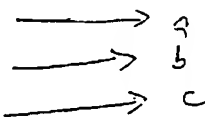
Signature: <u>blair</u>
Date: <u>200/4/28</u>

17080

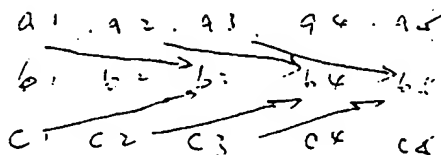
Subject: le-linear Algebra



if 4 not compare. 2 如 17



if a, c 2 17 找 threshold > b



17 frame/sec \Rightarrow 16.66 ns/frame

1920 x 1200 / frame 率 算

\Rightarrow 14.4676 ns/dot

17.36 μ s / line

a, b, c 取 是 h bit 数

a1, a2, a3, a4, a5, a6, a7, a8, a9, a10

b1, b2, b3, b4, b5, b6, b7, b8, b9, b10

c1, c2, c3, c4, c5, c6, c7, c8, c9, c10

if (a1 + a2 + ... + a9) - (c1 + c2 + ... + c10)

(a1 + ... + a9) - (c1 + ... + c9)

(a2 + ... + a10) - (c1 + ... + c1)

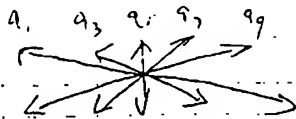
minimum \Rightarrow ~~17~~

closed To And Understood By Me

Name _____ Date _____
Name _____ Date _____

Signature: 2/10/12
Date: 2012/8/12

Subject: _____



check $(a_n - c_n) \geq (a_n - b_n)$ or $(a_n - c_n) \geq (b_{n+1} - c_n)$

if $\geq \Rightarrow b_n$ or b_{n+1} not

or $3 \geq 2$ or $3 \geq 2 \Rightarrow$ not

• $\frac{1}{2}$

$< \Rightarrow$ move and
cannot judge

\Rightarrow original $\frac{1}{2}$ minimum

Algorithm \Rightarrow if $b_n = b_{n+1}$
 $(a_n - b_n) = (a_{n+1} - b_{n+1}) \leftarrow (a_n - c_n) = (a_{n+1} - c_n)$

then ~~move and~~ $a_n \leq b_n$ $b_{n+1} \leq b_{n+1}$

else $\frac{1}{2}$ (old algorithm)

The simplest way is to check $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9$

if for $n = 1 \sim 8$ $a_n - b_n < a_n - c_n$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

then still picture (but for ~~moving~~ picture is still show

~~else~~ still for some case $\frac{1}{2} \rightarrow 4 \rightarrow 5$

else $b_n =$ old algorithm or $3 \rightarrow 4 \rightarrow 5 \Rightarrow$ still

or $5 \rightarrow 6 \rightarrow 7$

Disclosed To And Understood By Me

Name

Date

Signature: b/k i

Name

Date

Date: mon/4/5/3

17082
subject: Jpeg pump residue

File: D:\Jpegtest\1.tac 2000/5/3, 02:57:11PM

```
( Start Of Image )
( APP0 Marker
Length: 16
Version: 1.1
Density Unit: (aspect ratio)
X Density: 1
Y Density: 1
Thumbnail Width: 0
Thumbnail Height: 0
)
( Define Quantization Table
Length: 67
Table Index: 0
Table Precision: 0
Table Values:
11 8 8 10 8 7 11 10
9 10 13 12 11 13 17 28
19 17 15 15 17 34 25 26
20 28 41 36 43 42 40 36
39 39 45 50 64 55 45 48
61 48 39 39 56 76 57 61
67 69 72 73 72 43 54 79
85 78 70 84 64 71 72 69
)
( Define Quantization Table
Length: 67
Table Index: 1
Table Precision: 1
Table Values:
12 13 12 17 15 17 33 15
18 33 69 44 39 46 69 69
69 69 69 69 69 69 69 69
69 69 69 69 69 69 69 69
69 69 69 69 69 69 69 69
69 69 69 69 69 69 69 69
69 69 69 69 69 69 69 69
69 69 69 69 69 69 69 69
)
( Start Of Frame
Type: Baseline Huffman
Length: 1
Precision: 8
Height: 2362
Width: 3478
Component Count: 3
Component 1
Horizontal Frequency: 2
Vertical Frequency: 2
Quantization Table: 0
Component 2
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1
Component 3
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1
)
( Define Huffman Table
Length: 31
Table Index: 0
Table Class: DC
Code Counts: 0 1 1 1 1 1 1 0 0 0 0 0 0
Code Values: 0 1 2 3 4 5 6 7 8 9 a b
)
( Define Huffman Table
Length: 181
Table Index: 0
Table Class: AC
Code Counts: 0 2 1 3 3 2 4 3 5 5 4 4 0 0 1 7d
Code Values: 1 2 3 0 4 11 5 12 21 31 41 6 13 51 61 7
22 71 14 32 81 91 a1 8 23 42 b1 c1 15 52 d1 20
24 33 62 72 82 9 16 17 18 19 14 25 26 27 28
29 2a 34 35 36 37 38 39 3a 43 44 45 46 47 48 49
4a 52 54 55 56 57 58 59 6a 6b 6c 6d 6e 6f 69 69
6a 73 74 75 76 77 78 79 7a 83 84 85 86 87 88 89
8a 8b 8c 8d 8e 8f 91 92 93 94 95 96 97 98 99
a8 a9 aa ab ac ad ae af b1 b2 b3 b4 b5 b6 b7 b8 b9 ba bc bd be bf
c5 c7 c8 c9 ca cb cd ce cf d2 d3 d4 d5 d6 d7 d8 d9 da db dc dd de df
e2 e4 e5 e6 e7 e8 e9 ea eb ec ed ee ef f2 f3 f4 f5 f6 f7 f8
f9 fa
)
( Define Huffman Table
Length: 31
Table Index: 1
Table Class: DC
Code Counts: 0 3 1 1 1 1 1 1 1 0 0 0 0 0
Code Values: 0 1 2 3 4 5 6 7 8 9 a b
)
( Define Huffman Table
```

isclosed To And Understood By Me

Name _____ Date _____
Name _____ Date _____

Signature: 5/3
Date: 2000/5/3

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000540

Subject: _____

File: D:\Jpegtest\1.txt 2000/5/3, 02:57:11PM

```

Length: 181
Table Index: 1
Table Class: AC
Code Counts: 0 2 1 2 4 4 3 4 7 5 4 4 0 1 2 77
Code Values: 0 1 2 3 11 4 5 21 31 6 12 41 51 7 61 71
13 22 32 81 8 14 42 91 41 61 23 33 52 10
15 62 72 d1 a 16 24 34 e1 25 21 17 18 19 1a 26
27 28 29 2a 35 36 37 38 39 3a 43 44 45 46 47 48
49 4a 53 54 55 56 57 58 59 5a 63 64 65 66 67 68
69 6a 73 74 75 76 77 78 79 7a 82 83 84 85 86 87
88 89 8a 92 93 94 95 96 97 98 99 9a a2 a3 a4 a5
a6 a7 a8 a9 aa b2 b3 b4 b5 b6 b7 b8 b9 ba c2 c3
c4 c5 c6 c7 c8 c9 ca d2 d3 d4 d5 d6 d7 d8 d9 da
e2 e3 e4 e5 e6 e7 e8 e9 ea f2 f3 f4 f5 f6 f7 f8
f9 fa
)
( Start Of Scan
Length: 12
Scan Count: 3
Component ID: 1
AC Entropy Table: 0
DC Entropy Table: 0
Component ID: 2
AC Entropy Table: 1
DC Entropy Table: 1
Component ID: 3
AC Entropy Table: 1
DC Entropy Table: 1
Spectral Selection Start: 0
Spectral Selection End: d3
Successive Approximation High: 0
Successive Approximation Low: 0
)
( End Of Image )

```

Disclosed To And Understood By Me

Name Date

Name Date

Signature: blair

Date: 2001/5/3

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000541

17084
Subject: Jpeg code studying

File: D:\Jpegtest\open.jpg 2000/2/10, 12:48:02PM

APPC: JFIF format
Comment
APPC12
APPC14
Define quantization table

00000000h: FF DA FF E0 00 10 4A 46 49 46 00 01 02 00 00 64 77 JFIF... Length
00000001h: 00 64 00 00 FF 00 00 12 41 64 6F 62 63 20 00 6D d... Adobe Im
00000002h: 61 67 65 52 65 61 64 79 FF 00 00 11 44 75 63 6B ... Ready? Duck
00000003h: 79 00 01 00 04 00 00 00 37 00 00 FF 00 00 05 64 y... 7... 7.A
00000004h: 64 6F 62 63 00 64 C0 00 00 00 01 FF 00 00 64 00 d... d7... 7?
00000005h: 07 05 15 35 05 07 05 05 07 0A 07 0E 07 0A 0C
00000006h: 09 07 07 09 0C 0E 08 08 0C 08 08 0E 11 0C 0C 0C
00000007h: 0C 0C 0C 11 0E 10 11 11 11 10 0E 15 15 17 17 15
00000008h: 15 1F 1E 1E 1E 1F 23 23 23 23 23 23 23 23 23
00000009h: 01 08 08 08 0E 00 0E 18 12 12 18 1E 17 14 17 1E
0000000Ah: 23 23 23 23 23 23 23 23 23 23 23 23 23 23 23
0000000bh: 23 23 23 23 23 23 23 23 23 23 23 23 23 23 23
0000000ch: 23 23 23 23 23 23 23 23 23 23 23 23 23 23 23
0000000dh: 23 FF C0 00 11 08 00 11 00 9B 03 01 11 00 02 11
0000000eh: 01 03 11 01 FF C4 00 88 00 01 00 01 01 01 01 01
0000000fh: 00 00 00 00 00 00 00 00 00 01 00 02 06 07 08 04
00000010h: 01 01 01 01 00 03 01 00 00 00 00 00 00 00 00 00
00000011h: 00 00 01 05 02 03 06 04 10 00 01 02 04 04 02 06
00000012h: 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000013h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000014h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000015h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000016h: 04 11 21 31 41 B1 C1 12 42 05 00 01 81 32 62 72
00000017h: 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33
00000018h: 68 B7 B0 CE AA 73 73 73 73 73 73 73 73 73 73 73
00000019h: 97 3A AA 3A E5 EF 71 AA 9E E6 61 87 05 8D D2 84
0000001Ah: C8 92 E7 55 47 5C B0 6E 35 53 DC CC 4C 38 2C 6E
0000001bh: 04 19 10 10 10 10 10 10 10 10 10 10 10 10 10 10
0000001ch: 37 4A 13 26 5B 9D 55 14 BE 5E B7 1A A9 EE 66 26
0000001dh: 1C 36 37 4A 13 26 5B 9D 55 14 BD DE B7 1A A9 CE
0000001eh: 66 18 10 25 DD 23 4E 99 E2 75 54 75 BB D6 E1 55
0000001fh: 29 CC C4 23 96 C6 E9 41 93 2D CE AA 8E B7 79 0C
00000020h: 2A A3 3F 3A 41 12 77 77 77 77 77 77 77 77 77 77
00000021h: E7 70 AA 55 E6 62 41 02 43 4A 12 65 89 05 51
00000022h: D6 AF 3B 85 54 E7 33 0C 38 6C 6E 94 19 32 0C EA
00000023h: A8 E8 37 9D C2 A6 73 99 86 1C 36 37 4A 13 26 5B
00000024h: 9D 55 10 6A F1 99 54 7E 73 31 30 E1 B1 B4 42 64
00000025h: C8 73 AA A3 AD 5E 37 0A 99 CE 77 8C 48 6C 6D 10
00000026h: 64 CB 73 AA A3 AD 5E 37 0A 99 CE 66 26 24 36 36
00000027h: 88 4C 99 6E 75 54 75 AB C6 E1 53 39 CE F1 89 00
00000028h: 8D A2 0C 99 6E 75 54 75 8B 8B C4 98 43 5F 52 A9
00000029h: E8 37 A3 EF 09 B4 85 3D 00 A2 0C A9 6E 75 54 B3
0000002Ah: 37 AB C3 0E 23 AD 5E BE 51 C3 C6 15 57 22 8B 0E
0000002bh: A8 9D 50 3B 6B 12 A7 0F 2A 50 37 77 2A 2F 14 72
0000002ch: 04 DD F2 9F F6 18 CC B1 E8 69 EF D1 AD 6D 1A F0
0000002dh: 57 57 8B 90 F4 F4 F5 1D 2E DB 89 9C E3 5E 3F 8A
0000002eh: F8 2F 67 71 A7 86 F7 65 E3 C2 4E 9F 33 8A 5A AE
0000002fh: 04 57 8A 36 AB A8 5D 45 DE 1D 85 22 82 28 57 1E
00000030h: 0A 72 8E 44 72 7C 72 37 11 51 53 8A 74 3E D3 99
00000031h: 4F 12 1A 07 92 10 41 42 10 B1 00 A0 20 A1 08 28
00000032h: 08 24 05 90 10 48 41 04 14 20 10 41 20 10 42 00
00000033h: 24 21 00 3A 67 F2 1E 68 7E 86 86 3B 2B D1 AA D3
00000034h: C6 8A E3 30 FC 2B 8F 8F DA 7C 53 87 C9 22 39 3D
00000035h: 5C 97 C1 4D FF 00 69 0C 2A A2 C6 BD 9C 00 EE DF
00000036h: 76 DE 18 E3 0E F6 FA B1 C0 ED 36 4E 0A 79 93 E4
00000037h: 20 02 00 90 84 00 CB F3 97 D2 67 CF EA 53 63 DA
00000038h: 7A A9 9B BF E8 86 4D 0D C3 2C 48 08 20 20 90 82
00000039h: 08 28 40 20 82 40 20 84 00 48 42 00 68 F9 0F F6
0000003Ah: 46 3C 8E 76 1F 2E EF ED 4F D9 BD E6 9F B4 FF 00
0000003bh: 6F A2 9E 88 60 7E 2F CC 72 3D 29 FF D9
0000003ch: 07 -/附- ?

end of image

File: D:\Jpegtest\greendump.txt 2000/3/8

(Start Of Image)
APPC Marker
Length: 15
Version: 1.0
Density Unit: (aspect ratio) -> 1.0
X Density: 100
Y Density: 100
Thumbnail Width: 0
Thumbnail Height: 0

(Comment Marker)
Length: 18
Adobe ImageReady
(APPC Marker)
Length: 17
Ducky

Disclosed To And Understood By Me

Name	Date	Signature	2000/5/8
Name	Date	Date	2000/5/8

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000542

Subject:

```

1 APPE Marker
Length: 14 000E
Adobe
1
{ Define Quantization Table
Length: 132 307
Table Index: 0
Table Precision: 0
Table Values:
7 5 5 5 5 5 7 5
5 7 10 7 6 7 10 12
9 7 7 9 12 14 11 11
12 11 11 14 17 12 12 12
12 12 17 14 16 17 17
17 16 14 21 21 23 23 21
21 31 30 30 30 31 35 35
35 35 35 35 35 35 35 35

Table Index: 1
Table Precision: 0
Table Values:
8 8 8 14 13 14 27 18
18 27 30 23 20 23 30 35
35 35 35 35 35 35 35 35
35 35 35 35 35 35 35 35
35 35 35 35 35 35 35 35
35 35 35 35 35 35 35 35
35 35 35 35 35 35 35 35
35 35 35 35 35 35 35 35

1 Start Of Frame
Type: Baseline (Huffman)
Length: 17
Precision: 8
Height: 12
Width: 132
Component Count: 3
Component 1
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 0
Component 2
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1
Component 3
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1

1 Define Huffman Table
Length: 139
Table Index 0
Table Class: DC
Code Counts: 1 0 3 1 1 1 0 0 0 0 0 0 0 0 0 0
Code Values: 0 1 2 6 7 8 4
Table Index 1
Table Class: DC
Code Counts: 1 1 1 0 3 1 0 0 0 0 0 0 0 0 0 0
Code Values: 0 1 5 2 3 6 4
Table Index 0
Table Class: AC
Code Counts: 0 1 2 4 4 2 6 0 0 0 0 0 0 0 0
Code Values: 0 1 3 2 9 3 4 5 11 12 13 15 21 6 61 81
d1 42 72 51 c1 12 22 52 c2 33 14 84 36 7
Table Index 1
Table Class: AC
Code Counts: 0 1 3 3 2 3 6 7 0 0 0 0 0 0 0 0
Code Values: 0 1 2 3 9 11 12 13 21 31 41 51 61 71 81 91
42 52 62 72 82 92 102 112 122 132 142 152 162 172 182 192

1 Start Of Scan
Length: 12
Scan Count: 3

```

File: \D:\Opextest\greendump.txt 2000/:

Page: 2

```

Component ID: 1
AC Entropy Table: 0
DC Entropy Table: 0
Component ID: 2
AC Entropy Table: 1
DC Entropy Table: 1
Component ID: 3
AC Entropy Table: 1
DC Entropy Table: 1
Spectral Selection Start: 0
Spectral Selection End: 63
Successive Approximation High: 0
Successive Approximation Low: 0
( End Of Image )

```

Disclosed To And Understood By Me

Name	Date
Name	Date

Signature: blair
Date: 2007/5/8

17086
Subject:

File: D:\Jpegtest\blutxt2.jpg 1998/12/29, 03:18:56PM

```
00000000h: ff 00 ff 00 00 10 4a 46 49 46 00 01 01 00 00 01 : 77.JFIF.....
00000001h: 00 01 00 00 ff 00 00 43 00 00 07 08 09 08 07 08 : 7C.....
00000002h: 09 09 09 0c 08 08 00 10 1a 11 10 0f 0f 10 20 17 : .....
00000003h: 18 13 1a 26 22 28 28 26 22 25 24 2a 30 3d 33 2a : ...4" (14"15"0-3"
00000004h: 2d 39 2e 24 25 35 48 35 39 3f 41 44 45 44 29 33 : -9.555H597A0ED)3
00000005h: 4b 50 4a 42 4f 3d 43 44 41 ff 00 00 43 01 08 0c : KPJBO-CDA 7C...
00000006h: 0c 10 0e 10 1f 11 11 1f 41 2c 25 2c 41 41 41 41 : .....A.1.AAAA
00000007h: 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 : AAAAAAAAAAAAAAAAAA
00000008h: 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 : AAAAAAAAAAAAAAAAAA
00000009h: 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 : AAAAAAAAAAAAAAAAAA
0000000ah: 00 11 00 00 40 00 00 03 01 22 00 02 11 01 03 11 : .....9.8.....
0000000bh: 01 ff 00 10 00 00 01 00 01 01 01 01 01 01 00 : .....
0000000ch: 00 00 00 00 00 00 00 01 02 03 04 05 06 07 08 09 : .....
0000000dh: 0a 0b ff 00 00 00 00 00 01 02 03 04 05 06 07 : .....
0000000eh: 05 04 04 00 00 01 7d 01 02 03 00 04 11 05 12 21 : .....
0000000fh: 31 41 06 13 51 61 07 22 71 14 32 81 91 a1 08 23 : 1A..Qa."q.2778
00000010h: 42 b1 c1 15 52 d1 f0 24 33 62 72 82 09 0a 16 17 : 8bch.RfH$3be7...
00000011h: 18 19 1a 25 26 27 28 29 2a 34 35 36 37 38 39 3a : ...14" (14"15"0-3"
00000012h: 43 44 45 46 47 48 49 4a 53 54 55 56 57 58 59 5a : CDEFGHIJSTUVWXYZ
00000013h: 63 64 65 66 67 68 69 6a 73 74 75 76 77 78 79 7a : cdefghijstuvwxyz
00000014h: 83 84 85 86 87 88 89 8a 92 93 94 95 96 97 98 99 : 77777777
00000015h: 9a a2 a3 a4 a5 a6 a7 a8 a9 aa b2 b3 b4 b5 b6 b7 : 出它夾帶最斯須
00000016h: b8 b9 ba bc cd ce cf c0 c1 c2 c3 c4 c5 c6 c7 c8 : 號頭頭頭 均均均
00000017h: d6 d7 d8 d9 da db dc dd de df e0 e1 e2 e3 e4 e5 : 第第第第第第第第
00000018h: f2 f3 f4 f5 f6 f7 f8 f9 fa ff 00 01 02 03 04 : 第第第第第第第第
00000019h: 01 01 01 01 01 01 01 01 01 01 00 00 00 00 00 : .....
0000001ah: 02 03 04 05 06 07 08 09 0a 0b ff 00 00 00 00 : .....
0000001bh: 02 01 02 04 04 03 04 07 05 04 01 02 02 07 00 : .....
0000001ch: 01 02 03 11 04 05 21 31 06 02 01 01 01 01 13 : .....
0000001dh: 22 32 81 08 14 42 91 a1 b1 c1 09 23 33 52 f0 15 : "21.B 換.83R?
0000001eh: 62 72 c1 0a 16 24 34 e1 25 f1 17 18 19 1a 26 27 : br7.5477...4"
0000001fh: 28 29 2a 35 36 37 38 39 3a 43 44 45 46 47 48 49 : (1"56789:CDEFGHI
00000020h: 4a 53 54 55 56 57 58 59 5a 63 64 65 66 67 68 69 : JSTUVWXYZcdefghi
00000021h: 6a 73 74 75 76 77 78 79 7a 82 83 84 85 86 87 88 : jstuvwxyzt7777
00000022h: 89 8a 92 93 94 95 96 97 98 99 9a a2 a3 a4 a5 a6 : 77777 出它
00000023h: a7 a8 a9 aa b2 b3 b4 b5 b6 b7 b8 b9 ba bc cd ce : 夾帶最斯須號頭
00000024h: cf c0 c1 c2 c3 c4 d2 d3 d4 d5 d6 d7 d8 d9 da de : 號 均均均第第第
00000025h: e3 e4 e5 e6 e7 e8 e9 ea fb fc fd fe ff 00 01 : 第第第第第第第第
00000026h: fa ff 00 00 0c 03 01 00 02 11 03 11 00 3f 00 : 77.....7.7
00000027h: c8 c7 c0 69 41 e9 8e 29 81 9e 79 14 a1 f9 c1 15 : '1A7)7y./?
00000028h: 08 92 39 83 67 a9 a4 21 80 18 6a 37 72 29 49 a0 : 79 庫. (37x)1?
00000029h: 05 10 02 e4 52 93 c3 77 35 22 73 ff 0c d6 a6 92 : ..號775+...號?
0000002ah: 78 a0 07 e7 3e fa 98 1c 70 05 26 83 8a 53 cf 6a : x777.p.47555
0000002bh: 00 46 5c 1c 56 90 8f 94 11 52 75 c7 6a 00 f9 88 : ..FA.77.RU
0000002ch: ce 45 c0 45 b8 20 d2 e3 a7 34 e9 14 03 4d 39 c0 : 話.E7577.H9?
0000002dh: c7 34 00 63 3c d2 1f a5 29 7a 1f 1a 7c c6 47 34 : 2.c<777.Jq774
0000002eh: 00 d5 c1 a3 18 fe 23 4e 28 81 d7 1c d0 7a 00 00 : 機71N+...在?
0000002fh: 38 a6 86 c3 fa 8f 6a 77 eb 49 84 1e 7a 66 80 06 : 8755 w7777f
00000030h: 20 9e 28 c6 47 e3 41 5f 5e d0 29 39 1e 04 00 72 : 7555 -79.7x
00000031h: 09 a6 49 c1 02 a4 ce 5b 3d 68 64 0c 41 a0 06 96 : .句7及[-hd.A7?
00000032h: 03 47 6a 32 0e 28 0b c6 38 a4 23 9e 4d 00 3f af : .Gj2. (77 .77
00000033h: f0 d2 8e 07 14 cc fa 1c d2 8d df 85 00 38 02 13 : 換7.細.77.87
00000034h: 8e d4 84 90 47 71 43 83 d6 80 14 80 3d a8 c9 07 : 7GQC .7草.
00000035h: 6e 99 ce 69 39 fa 50 04 bd 4e 71 4d 65 e3 a7 4a : 7姚9 .85qMe5J
00000036h: 41 b8 14 07 c7 07 ad 00 7f ff 00 :
A7.77 ?
```

File: D:\Jpegtest\blutxt2dump.txt 2000/3/8, 10:24:00AM

```
( Start Of Image )
( APP0 Marker
Length: 16
Version: 1.1
Density Unit: (aspect ratio)
X Density: 1
Y Density: 1
Thumbnail Width: 0
Thumbnail Height: 0
)
( Define Quantization Table
Length: 67
Table Index: 0
Table Precision: 0
Table Values:
11 7 8 9 8 7 11 9
9 9 12 11 11 12 16 26
17 16 13 13 16 13 14 24
15 12 14 14 11 11 11 11
37 36 42 43 61 51 42 42
57 46 36 37 53 72 53 37
63 62 62 63 63 63 63 63
60 74 66 79 61 67 68 63
)
( Define Quantization Table
Length: 67
Table Index: 1
Table Precision: 0
Table Values:
11 12 12 16 14 16 31 17
17 31 63 44 37 44 63 63
63 63 63 45 63 63 63 63
63 63 63 63 63 63 63 63
```

closed To And Understood By Me

Name _____ Date _____

Signature: blutxt

Name _____ Date _____

Date: 2000/3/8

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000544

subject:

65 65 65 65 65 65 65 65
65 65 65 65 65 65 65 65
65 65 65 65 65 65 65 65
65 65 65 65 65 65 65 65

```
( Start Of Frame
Type: Baseline (Huffman)
Length: 17
Precision: 8
Height: 64
Width: 64
Component Count: 3
Component 1 Y
Horizontal Frequency: 2
Vertical Frequency: 2
Quantization Table: 0
Component 2 Cb
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1
Component 3 Cr
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1
```

```

Define Huffman Table
Length: 31
Table Index 0
Table Class: DC
Code Counts: 0 1 3
Code Values: 0 1 3

```

```

) Define Huffman Table
Length: 181
Table Index 0
Table Class: AC
Code Counts: 0 2 1
Code Values: 1 2

```

```

Define Huffman Table
Length: 31
Table Index 1
Table Class: DC
Code Counts: 0 3 1
Code Values: 0 1

```

```

1 Define Huffman Table
Length: 181
Table Index 1
Table Class: AC
Code Counts: 0.2 1
Code Values: 0 1

```

```

)
Start Of Scan
Length: 12
Scan Count: 3
Component ID: 1
AC Entropy Table: 0
DC Entropy Table: 0
Component ID: 2
AC Entropy Table: 1
DC Entropy Table: 1
Component ID: 3
AC Entropy Table: 1
DC Entropy Table: 1
Spectral Selection Start: 0
Spectral Selection End: 63
Successive Approximation High: 0
Successive Approximation Low: 0

```

(End Of Image)

disclosed To And Understood By Me

Name	Date
Name	Date

Signature: blair
Date: 2/5/8

17028

Subject: JPEG study

JPEG

The first four bytes of a JPEG file are always ffd8ffe0. This is followed by 2 bytes of header length, and the string "JFIF". These are followed by units used for resolution, horizontal and vertical resolutions.

The RGB color can be translated to the YCbCr (YUV) scheme, using the formula

$$Y = 0.299R + 0.587G + 0.114B$$

$$Cb = 0.1687R - 0.3313G + 0.5B$$

$$Cr = 0.5R - 0.4187G - 0.0813B$$

Subsampling is used in JPEG, so that one Cb and Cr sample is used for each four Y samples, and this saves 50% of the space. Then, discrete cosine transform (DCT) is applied separately to 8 by 8 blocks of data for each YCbCr component.

An 8 by 8 table of quantization factors is used. The DCT elements are divided by the corresponding quantization factors and rounded to integers.

The DC components (the (0,0) element of DCT) are replaced by the differences from the DC components of the previous blocks. This differential value may be between -32767 and 32768. These are then grouped into 16 categories, category n being the set of numbers between 2^{n-1} and $2^n - 1$ and their negative counterparts. Each category has its Huffman code, followed by n bits specifying the element in the category. The rest of the DCT elements are called AC elements and are aligned in a zigzag fashion. Each nonzero AC element is combined with the number of zeros preceding it in the alignment and transmitted using a Huffman code.

if jpg 轉成 BMP 後，再抓 BMP 的

RGB → 轉成 YUV

⇒ test pattern is generated

Disclosed To And Understood By Me

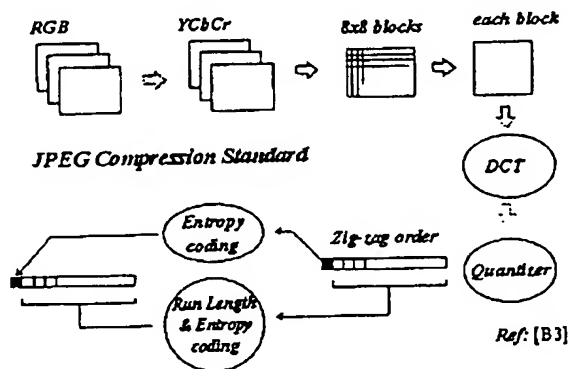
Name _____	Date _____	Signature: <u>blsif</u>
Name _____	Date _____	Date: <u>2001/5/19</u>

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

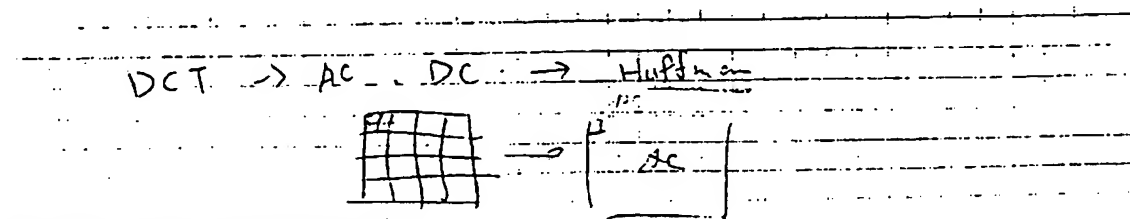
TR000546

數位影像若不經過壓縮，是佔空間的。通常來說，數位影像可以壓縮到原本的十幾倍都不會看得出來有什麼不一樣。影像壓縮最主要的技術，是利用人眼睛對高頻率信號的不敏感，故將那些信號丟棄或用很少的空間去存一個大概的值。

目前影像壓縮的技術大概以 JPEG 最為成熟，以下就 JPEG 的大概流程加以說明，若希望知道詳細的 JPEG 壓縮格式，請參看 CCITT Recommendation T.81。



1. 將 RGB 的影像轉換成 Y Cb Cr 三個 Components。
2. 將每一個 Component 切成 8x8 的方塊。
3. 對每一個小方塊做 Discrete Cosine Transform (DCT)。
4. 把 DCT 的係數根據 Quantization Table 除以他相對的 Quantization value。
5. 把 DCT 的第一個係數 (DC值) 用 Predictive coding 加上 Entropy coding (可以用 Huffman coding 或是 Alrithmetic coding) 加以編碼。
6. 把 DCT 其它的係數 (AC值) 用 Run length coding 及 Entropy coding (可以用 Huffman coding 或是 Alrithmetic coding) 加以編碼。



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17030
Subject: huffman code

A quick tutorial on generating a huffman tree

Lets say you have a set of numbers and their frequency of use and want to create a huffman encoding for them:

FREQUENCY VALUE

5	1
7	2
10	3
15	4
20	5
45	6

Creating a huffman tree is simple. Sort this list by frequency and make the two-lowest elements into leaves, creating a parent node with a frequency that is the sum of the two lower element's frequencies:

```
12:*  
 /  \  
5:1  7:2
```

The two elements are removed from the list and the new parent node, with frequency 12, is inserted into the list by frequency. So now the list, sorted by frequency, is:

```
10:3  
12:*  
15:4  
20:5  
45:6
```

You then repeat the loop, combining the two lowest elements. This results in:

```
22:*  
 /  \  
10:3  12:*  
      /  \  
      5:1  7:2
```

and the list is now:

```
15:4  
20:5  
22:*  
45:6
```

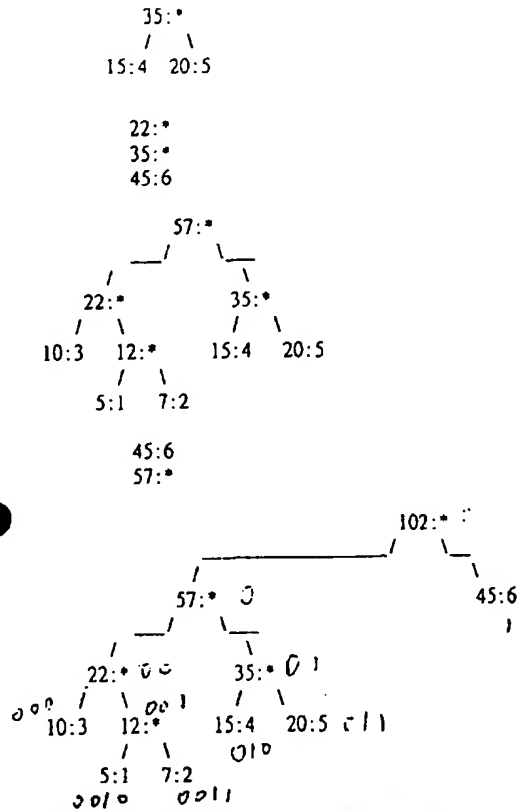
You repeat until there is only one element left in the list.

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Date: 10/5/19

Subject: _____



Now the list is just one element containing 102:*, you are done.

This element becomes the root of your binary huffman tree. To generate a huffman code you traverse the tree to the value you want, outputting a 0 every time you take a lefthand branch, and a 1 every time you take a righthand branch. (normally you traverse the tree backwards from the code you want and build the binary huffman encoding string backwards as well, since the *first* bit must start from the top).

Example: The encoding for the value 4 (15:4) is 010. The encoding for the value 6 (45:6) is 1

Decoding a huffman encoding is just as easy : as you read bits in from your input stream you traverse the tree beginning at the root, taking the left hand path if you read a 0 and the right hand path if you read a 1. When you hit a leaf, you have found the code.

Generally, any huffman compression scheme also requires the huffman tree to be written out as part of the file, otherwise the reader cannot decode the data. For a static tree, you don't have to do this since the tree is known and fixed.

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subject: _____

The easiest way to output the huffman tree itself is to, starting at the root, dump first the left hand side then the right hand side. For each node you output a 0, for each leaf you output a 1 followed by N bits representing the value. For example, the partial tree in my last example above using 4 bits per value can be represented as follows:

000100 fixed 6 bit byte indicates how many bits the value
for each leaf is stored in. In this case, 4. 0001 0000
0 root is a node
 left hand side is
10011 a leaf with value 3
 right hand side is
0 another node
 recurse down, left hand side is
10001 a leaf with value 1
 right hand side is
10010 a leaf with value 2
 recursion return

So the partial tree can be represented with 00010001001101000110010, or 23 bits. Not bad!

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Name	Date

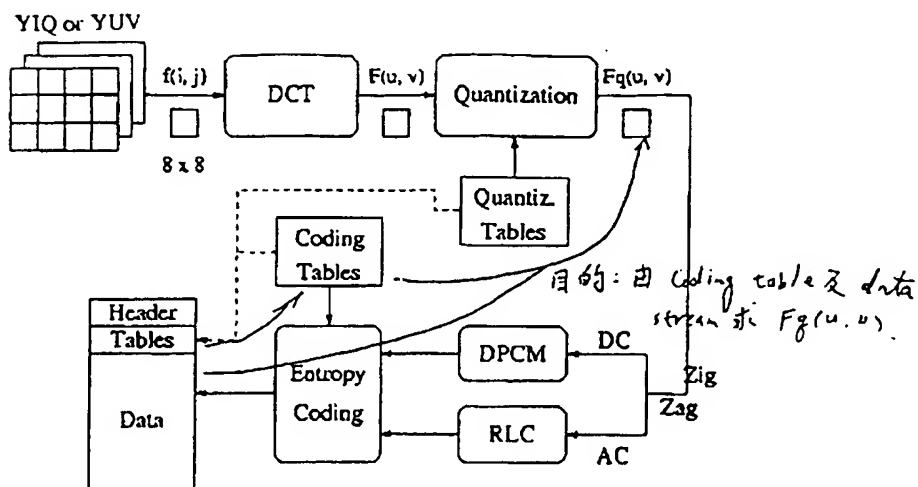
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TR000550

Subject: JPEG Decode step study

17003



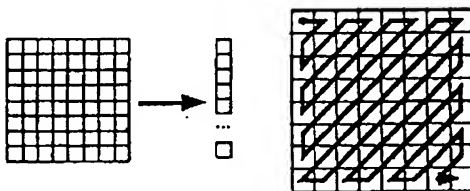
- Decoding -- Reverse the order

4.2.2. Major Steps

- DCT (Discrete Cosine Transformation)
- Quantization
- Zigzag Scan
- DPCM on DC component
- RLE on AC Components
- Entropy Coding

3. Zig-zag Scan

- Why? -- to group low frequency coefficients in top of vector.
- Maps 8 x 8 to a 1 x 64 vector



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4. Differential Pulse Code Modulation (DPCM) on DC component

- DC component is large and varied, but often close to previous value.
- Encode the difference from previous 8 x 8 blocks -- DPCM

5. Run Length Encode (RLE) on AC components

- 1 x 64 vector has lots of zeros in it
- Keeps *skip* and *value*, where *skip* is the number of zeros and *value* is the next non-zero component.
- Send (0,0) as end-of-block sentinel value.

6. Entropy Coding

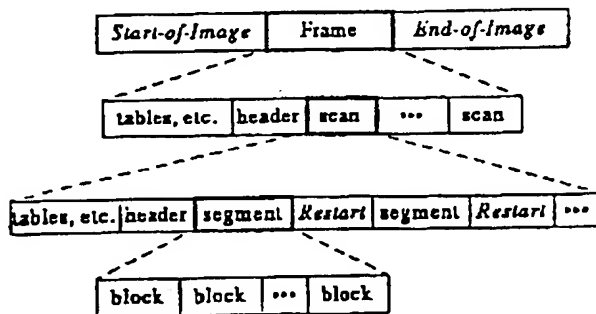
- Categorize DC values into SIZE (number of bits needed to represent) and actual bits.

SIZE	Value
1	-1, 1
2	-3, -2, 2, 3
3	-7...-4, 4...7
4	-15...-8, 8...15
.	.
10	-1023...-512, 512...1023

Example: if DC value is 4, 3 bits are needed.

Send off SIZE as Huffman symbol, followed by actual 3 bits.

- For AC components two symbols are used: Symbol_1: (*skip*, *SIZE*), Symbol_2: actual bits. Symbol_1 (*skip*, *SIZE*) is encoded using the Huffman coding, Symbol_2 is not encoded.
- Huffman Tables can be custom (sent in header) or default.



- A "Frame" is a picture, a "scan" is a pass through the pixels (e.g., the red component), a "segment"

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Subject: _____

17095

is a group of blocks, a "block" is an 8 x 8 group of pixels.

- Frame header:
 - sample precision
 - (width, height) of image
 - number of components
 - unique ID (for each component)
 - horizontal/vertical sampling factors (for each component)
 - quantization table to use (for each component)
- Scan header
 - Number of components in scan
 - component ID (for each component)
 - Huffman table for each component (for each component)
- Misc. (can occur between headers)
 - Quantization tables
 - Huffman Tables
 - Arithmetic Coding Tables
 - Comments
 - Application Data

4.2.4. Four JPEG Modes

- Sequential Mode
- Lossless Mode
- Progressive Mode
- Hierarchical Mode

** In "Motion JPEG", Sequential JPEG is applied to each image in a video.

1. Sequential Mode

- Each image component is encoded in a single left-to-right, top-to-bottom scan.

Baseline Sequential Mode, the one that we described above, is a simple case of the Sequential mode:

- It supports only 8-bit images (not 12-bit images)
- It uses only Huffman coding (not Arithmetic coding)

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17096
Subject: Huff comp & Huff deco

File: D:\Jpegtest\2.txt 2000/5/10, 03:06:54PM

• 2

File: D:\Jpegtest\2.txt 2000/5/10, 03:06:54PM

00000000h: 61 00 0A

encode

File: D:\Jpegtest\2.txt 2000/5/10, 03:06:54PM

00000000h: 01 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ;
00000010h: 0A 61 80

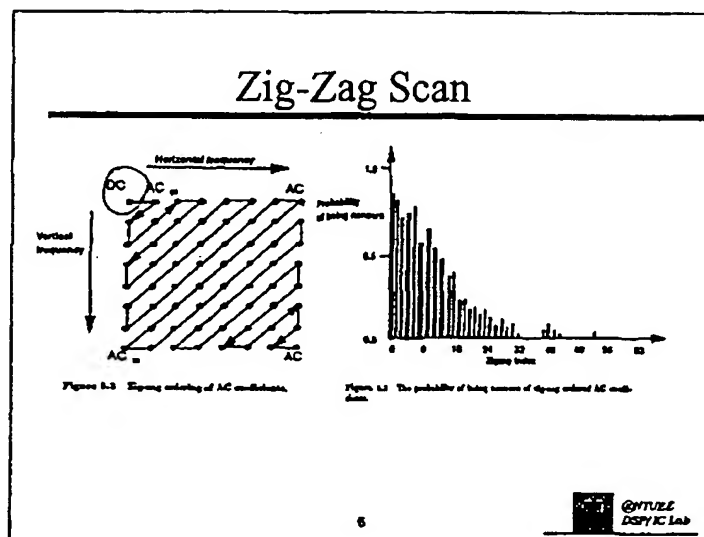
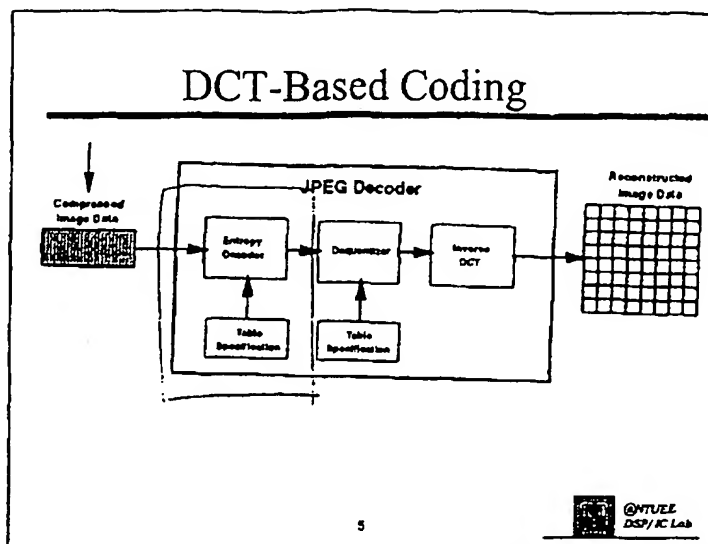
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Name _____

Date _____

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Predictive Coding of DC Coefficients

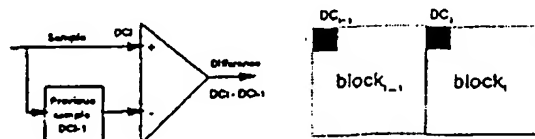


Figure 5.4 Predictive coding of DC coefficients. The difference between the present and the previous DC coefficients is calculated and then coded using JPEG.

9

Entropy Coding

- Huffman coding and Arithmetic coding
- Huffman encoder (two steps)
 - forming intermediate symbol sequence
 - converting intermediate symbol sequence into binary sequence using Huffman table
- DC : (Size, amplitude),
 - where size defines the number of bits required to represent the amplitude, and amplitude is the 1's complement amplitude of differential.
 - Only the size is Huffman coded.
- AC : (runlength, size, amplitude)

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Subject: Jpeg code security &

17099

8 x 8 pixels graph & Black image (R=0 G=0 B=0)

File: D:\Jpegtest\black8x8.ppm 2000/5/10, 04:48:09PM

```
P3
# Created by Paint Shop Pro 6
# 8
255
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

File: D:\Jpegtest\black8x8.jpg 2000/5/10, 04:45:06PM

```
00000000h: ff 00 ff 00 00 10 4a 48 49 46 00 01 01 01 00 48 77.JFIF....H
00000010h: 00 48 00 00
```

Y don't

File: D:\Jpegtest\b8x8 2000/5/10, 04:46:49PM

```
( Start Of Image )
APP0 Marker
Length: 16
Version: 1.1
Density Unit: (pixels per inch)
X Density: 72
Y Density: 72
Thumbnail Width: 0
Thumbnail Height: 0
```

length of DAT

```
00000020h: 04 04 04 05 05 05 06 07 0c 08 07 07 07 0f 08
00000030h: 08 09 0c 11 0f 12 12 11 0f 11 11 13 16 1c 13
00000040h: 14 1a 15 11 11 18 21 15 1a 1d 1f 1f 1f 1f 1f
00000050h: 22 24 22 1e 24 1c 1e 1f 1e
```

Define Quantization Table
Length: 67
Table Index: 0
Table Precision: 0
Table Values:

5	3	4	4	4	3	5	4
4	4	5	5	5	6	7	12
8	7	7	7	15	11	11	
9	12	17	15	18	18	17	15
17	17	19	22	28	23	19	20
24	21	17	17	24	33	24	26
29	29	31	31	31	19	23	34
36	34	30	36	28	30	31	30

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17100
Subject:

0000060h: 05 07 06 07 0E 08 08 0C 1E FF DB 00 43 0E 0E 05
0000070h: 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E
0000080h: 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E
0000090h: 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E 1E

Define Quantization Table

Length: 67
Table Index: 1
Table Precision: 0
Table Values:
5 5 5 7 6 7 14 8
8 14 30 20 17 20 30 30
30 30 30 30 30 30 30 30
30 30 30 30 30 30 30 30
30 30 30 30 30 30 30 30
30 30 30 30 30 30 30 30
30 30 30 30 30 30 30 30
30 30 30 30 30 30 30 30

000000a0h: (00 12) 08 00 08) 00 08 03 01 22 00 02 11 01 03 11
000000b0h: 01

Start Of Frame

Type: Baseline (Huffman)
Length: 17
Precision: 8
Height: 8
Width: 8
Component Count: 3
Component 1
Horizontal Frequency: 2
Vertical Frequency: 2
Quantization Table: 0
Component 2
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1
Component 3
Horizontal Frequency: 1
Vertical Frequency: 1
Quantization Table: 1

000000c0h: 00 00 00 00 00 00 00 00 01 02 03 04 05 06 07 08 09
000000d0h: 0A 0B

Define Huffman Table

Length: 31
Table Index: 0
Table Class: DC
Code Counts: 0 1 5 1 1 1 1 1 1 0 0 0 0 0 0 0
Code Values: 1 2 3 4 5 6 7 8 9 a b

000000e0h: 05 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
000000f0h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000100h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000110h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000120h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000130h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000140h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000150h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000160h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000170h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14
00000180h: 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14

Define Huffman Table

Length: 181
Table Index: 0
Table Class: AC
Code Counts: 0 2 1 3 3 2 4 3 5 5 4 4 0 0 1 7d
Code Values: 1 2 3 4 5 6 7 8 9 a b c d e f 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 a0 a1 a2 a3 a4 a5 a6 a7 a8 a9 aa ab ac ad ae af b0 b1 b2 b3 b4 b5 b6 b7 b8 b9 ba bb bc bd be bf c0 c1 c2 c3 c4 c5 c6 c7 c8 c9 ca cb cc cd ce cf d0 d1 d2 d3 d4 d5 d6 d7 d8 d9 da db dc dd de df e0 e1 e2 e3 e4 e5 e6 e7 e8 e9 ea eb ec ed ee ef f0 f1 f2 f3 f4 f5 f6 f7 f8 f9 fa fb fd fe ff

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00000190h: 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01 01
00000190h: 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 00 01

(Define Huffman Table
Length: 31
Table Index: 1
Table Class: DC
Code Counts: 0 3 1 1 1 1 1 1 1 1 0 0 0 0 0
Code Values: 0 1 2 3 4 5 6 7 8 9 A B

→ 80(514x4x2.113)-1

000001b0h: 02 01 02 04 04 03 04 07 05 04 04 00 01 02 77 00
000001c0h: 01 02 03 11 04 05 21 31 06 12 41 51 07 61 71 13
000001d0h: 22 32 81 08 14 42 91 A1 B1 C1 09 23 33 52 F0 15
000001e0h: 62 72 01 0A 16 24 34 E1 25 F1 17 18 19 1A 26 27
000001f0h: 28 29 2A 35 36 37 38 39 3A 43 44 45 46 47 48 49
00000200h: 4A 53 54 55 56 57 58 59 5A 63 64 65 66 67 68 69
00000210h: 6A 73 74 75 76 77 78 79 7A 82 83 84 85 86 87 88
00000220h: 89 8A 92 93 94 95 96 97 98 99 9A A2 A3 A4 A5 A6
00000230h: A7 A8 A9 AA B2 B3 B4 B5 B6 B7 B8 B9 BA C2 C3 C4
00000240h: C5 C6 C7 C8 C9 CA D2 D3 D4 D5 D6 D7 D8 D9 DA E2
00000250h: E3 E4 E5 E6 E7 E8 E9 EA F2 F3 F4 F5 F6 F7 F8 F9
00000260h: FA

(Define Huffman Table

Length: 181
Table Index: 1
Table Class: AC
Code Counts: 0 2 1 2 4 4 3 4 7 3 4 4 0 1 2 77
Code Values: 0 1 2 3 11 4 5 21 31 6 12 41 51 7 61 71
13 22 32 81 8 14 42 91 a1 b1 c1 9 23 33 52 f0
15 62 72 d1 a 16 24 34 e1 25 f1 17 18 19 1a 26
27 28 29 2a 35 36 37 38 39 3a 43 44 45 46 47 48
49 4a 53 54 55 56 57 58 59 5a 63 64 65 66 67 68
69 6a 73 74 75 76 77 78 79 7a 82 83 84 85 86 87
88 89 8a 92 93 94 95 96 97 98 99 9a a2 a3 a4 a5
a6 a7 a8 a9 aa b2 b3 b4 b5 b6 b7 b8 b9 ba c2 c3
c4 c5 c6 c7 c8 c9 ca d2 d3 d4 d5 d6 d7 d8 d9 da
e2 e3 e4 e5 e6 e7 e8 e9 ea f2 f3 f4 f5 f6 f7 f8
f9 fa

00000270h: FF DA 00 DC 03 01 00 02 11 03 11 00 3F 00 (rs
7(7 7

(Start Of Scan
Length: 12
Scan Count: 3
Component ID: 1
AC Entropy Table: 0
DC Entropy Table: 0
Component ID: 2
AC Entropy Table: 1
DC Entropy Table: 1
Component ID: 3
AC Entropy Table: 1
DC Entropy Table: 1
Spectral Selection Start: 0
Spectral Selection End: 63
Successive Approximation High: 0
Successive Approximation Low: 0

(End Of Image)

real data stream: F8 CA 8A 28 A0 0F

和 1x1 及 16x16 28-Height & width 不同 且 余数皆相同

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17102

Subject: _____

(F) Huff decod 2 decode DCO, DC1, ACC, AC1

=> decode {2} DCO, DC1, AC1 = 00, ACC = 01

decode green.jpg 63 DCO, DC1, ACC, AC1

=> decode {2} DCO = 01, DC1, ACC, AC1 = 00

Huffman table 有 3 个 2 ~~3 个 2~~

A) encoder 2 encode bhp => Huffman table

表 2 个

Huffman AC code low pres on a

DC code on b

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Name

Date

Date:

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subject: Huffman table

17103

B.2.4.2 Huffman table-specification syntax

Figure B.7 specifies the marker segment which defines one or more Huffman table specifications.

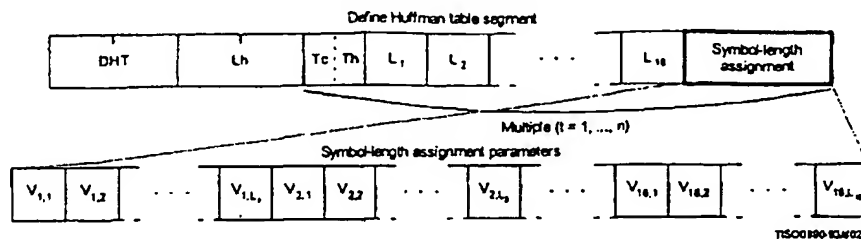


Figure B.7 - Huffman table syntax

The marker and parameters shown in Figure B.7 are defined below. The size and allowed values of each parameter are given in Table B.5.

DHT: Define Huffman table marker - Marks the beginning of Huffman table definition parameters.

Lh: Huffman table definition length - Specifies the length of all Huffman table parameters shown in Figure B.7 (see B.1.1.4).

Tc: Table class - 0 = DC table or lossless table, 1 = AC table.

Th: Huffman table destination identifier - Specifies one of four possible destinations at the decoder into which the Huffman table shall be installed.

Li: Number of Huffman codes of length i - Specifies the number of Huffman codes for each of the 16 possible lengths allowed by this Specification. Li's are the elements of the list BITS.

Vij: Value associated with each Huffman code - Specifies, for each i, the value associated with each Huffman code of length i. The meaning of each value is determined by the Huffman coding model. The Vij's are the elements of the list HUFFVAL.

Table B.5 - Huffman table specification parameter sizes and values

Parameter	Size (bits)	Values			
		Sequential DCT		Progressive DCT	Lossless
		Baseline	Extended		
Lh	16	$2 + \sum_{i=1}^n (17 + m_i)$			
Tc	4	0, 1		0	
Th	4	0, 1	0-3		
Li	8	0-255			
V _{l,j}	8	0-255			

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Subject: _____

The value n in Table B.5 is the number of Huffman tables specified in the DHT marker segment. The value m_t is the number of parameters which follow the 16 $L_i(t)$ parameters for Huffman table t , and is given by:

$$m_t = \sum_{i=1}^{16} L_i$$

In general, m_t is different for each table.

Once a Huffman table has been defined for a particular destination, it replaces the previous tables stored in that destination and shall be used when referenced, in the remaining scans of the current image and in subsequent images represented in the abbreviated format for compressed image data. If a table has never been defined for a particular destination, then when this destination is specified in a scan header, the results are unpredictable.

Huffman tables are specified in terms of a 16-byte list (BITS) giving the number of codes for each code length from 1 to 16. This is followed by a list of the 8-bit symbol values (HUFFVAL), each of which is assigned a Huffman code. The symbol values are placed in the list in order of increasing code length. Code lengths greater than 16 bits are not allowed. In addition, the codes shall be generated such that the all-1-bits code word of any length is reserved as a prefix for longer code words.

NOTE - The order of the symbol values within HUFFVAL is determined only by code length. Within a given code length the ordering of the symbol values is arbitrary.

This annex specifies the procedure by which the Huffman tables (of Huffman code words and their corresponding 8-bit symbol values) are derived from the two lists (BITS and HUFFVAL) in the interchange format. However, the way in which these lists are generated is not specified. The lists should be generated in a manner which is consistent with the rules for Huffman coding, and it shall observe the constraints discussed in the previous paragraph. Annex K contains an example of a procedure for generating lists of Huffman code lengths and values which are in accord with these rules.

NOTE - There is no requirement in this Specification that any encoder or decoder shall implement the procedures in precisely the manner specified by the flow charts in this annex. It is necessary only that an encoder or decoder implement the function specified in this annex. The sole criterion for an encoder or decoder to be considered in compliance with this Specification is that it satisfy the requirements given in clause 6 (for encoders) or clause 7 (for decoders), as determined by the compliance tests specified in Part 2.

C.1 Marker segments for Huffman table specification

The DHT marker identifies the start of Huffman table definitions within the compressed image data. B.2.4.2 specifies the syntax for Huffman table specification.

C.2 Conversion of Huffman table specifications to tables of codes and code lengths

Conversion of Huffman table specifications to tables of codes and code lengths uses three procedures. The first procedure (Figure C.1) generates a table of Huffman code sizes. The second procedure (Figure C.2) generates the Huffman codes from the table built in Figure C.1. The third procedure (Figure C.3) generates the Huffman codes in symbol value order.

Given a list BITS (1 to 16) containing the number of codes of each size, and a list HUFFVAL containing the symbol values to be associated with those codes as described above, two tables are generated. The HUFFSIZE table contains a list of code lengths; the HUFFCODE table contains the Huffman codes corresponding to those lengths.

Note that the variable LASTK is set to the index of the last entry in the table.

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Subject: _____

ISO/IEC 10918-1 : 1993(E)

A Huffman code table, HUFFCODE, containing a code for each size in HUFFSIZE is generated by the procedure in Figure C.2. The notation "SLL CODE 1" in Figure C.2 indicates a shift-left-logical of CODE by one bit position.

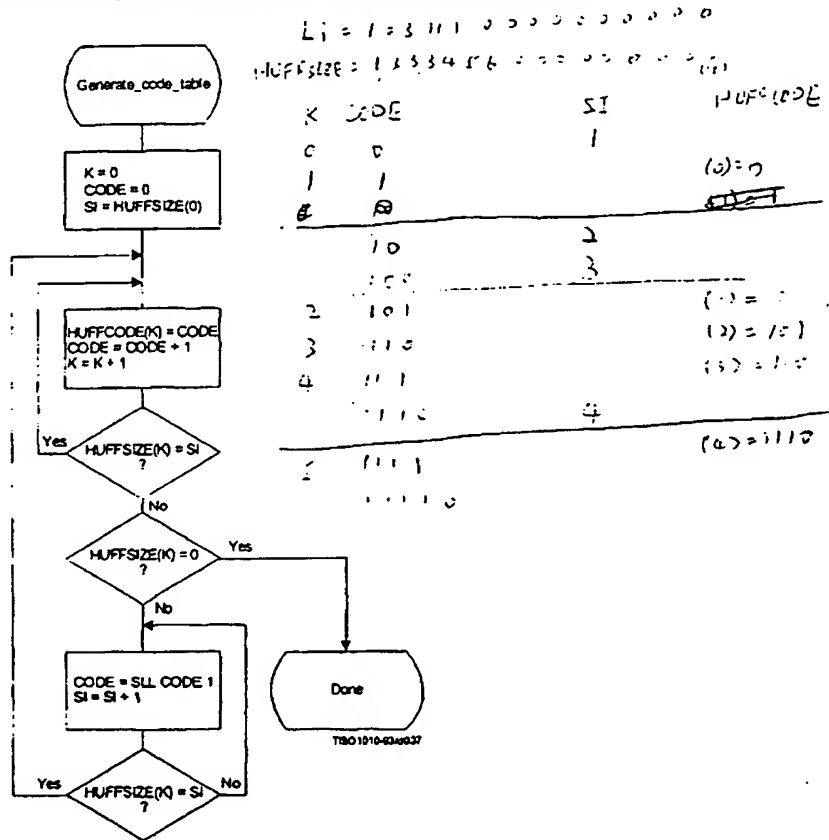


Figure C.2 - Generation of table of Huffman codes

Two tables, HUFFCODE and HUFFSIZE, have now been generated. The entries in the tables are ordered according to increasing Huffman code number value and length.

The encoding procedure code tables, EHUFFCO and EHUFFSI, are created by reordering the codes specified by HUFFCODE and HUFFSIZE according to the symbol values assigned to each code in HUFFVAL.

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ISO/IEC 10918-1 : 1993(E)

Figure C.3 illustrates this ordering procedure.

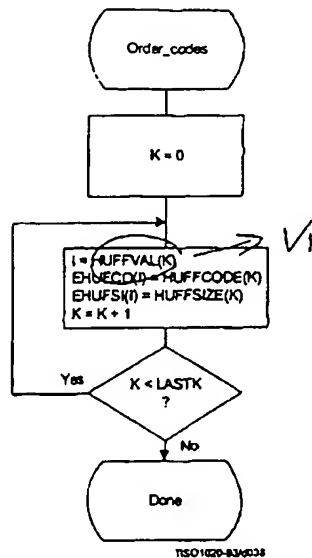


Figure C.3 - Ordering procedure for encoding procedure code tables

C.3 Bit ordering within bytes

The root of a Huffman code is placed toward the MSB (most-significant-bit) of the byte, and successive bits are placed in the direction MSB to LSB (least-significant-bit) of the byte. Remaining bits, if any, go into the next byte following the same rules.

Integers associated with Huffman codes are appended with the MSB adjacent to the LSB of the preceding Huffman code.

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E.2.3 Control procedure for decoding a scan

Figure E.8 shows the decoding of a scan.

The loop is terminated when the expected number of restart intervals has been decoded.

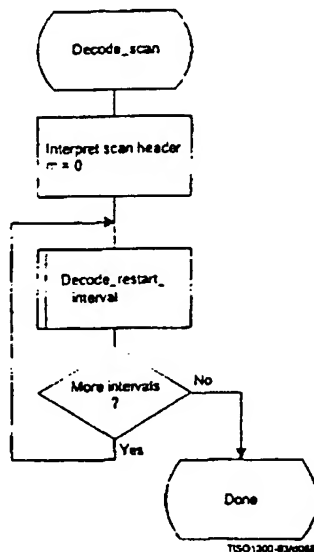


Figure E.8 - Control procedure for decoding a scan

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F.1.1.5 Encoding models for the sequential DCT procedures

The two dimensional array of quantized DCT coefficients is rearranged in a zig-zag sequence order defined in A.3.6. The zig-zag order coefficients are denoted ZZ(0) through ZZ(63) with:

$$ZZ(0) = S_{00}, ZZ(1) = S_{01}, ZZ(2) = S_{10}, \dots, ZZ(63) = S_{77}$$

S_{mn} are defined in Figure A.6.

Two coding procedures are used, one for the DC coefficient ZZ(0) and the other for the AC coefficients ZZ(1), ZZ(63). The coefficients are encoded in the order in which they occur in zig-zag sequence order, starting with the DC coefficient. The coefficients are represented as two's complement integers.

F.1.1.5.1 Encoding model for DC coefficients

The DC coefficients are coded differentially, using a one-dimensional predictor, PRED, which is the quantized DC value from the most recently coded 8×8 block from the same component. The difference, DIFF, is obtained from

$$DIFF = ZZ(0) - PRED$$

At the beginning of the scan and at the beginning of each restart interval, the prediction for the DC coefficient prediction is initialized to 0. (Recall that the input data have been level shifted to two's complement representation.)

F.1.1.5.2 Encoding model for AC coefficients

Since many coefficients are zero, runs of zeros are identified and coded efficiently. In addition, if the remaining coefficients in the zig-zag sequence order are all zero, this is coded explicitly as an end-of-block (EOB).

F.1.2 Baseline Huffman encoding procedures

The baseline encoding procedure is for 8-bit sample precision. The encoder may employ up to two DC and two AC Huffman tables within one scan.

F.1.2.1 Huffman encoding of DC coefficients

F.1.2.1.1 Structure of DC code table

The DC code table consists of a set of Huffman codes (maximum length 16 bits) and appended additional bits (in most cases) which can code any possible value of DIFF, the difference between the current DC coefficient and the prediction. The Huffman codes for the difference categories are generated in such a way that no code consists entirely of 1-bits ('X'FF' prefix marker code avoided).

The two's complement difference magnitudes are grouped into 12 categories, SSSS, and a Huffman code is created for each of the 12 difference magnitude categories (see Table F.1).

For each category, except SSSS = 0, an additional bits field is appended to the code word to uniquely identify which difference in that category actually occurred. The number of extra bits is given by SSSS; the extra bits are appended to the LSB of the preceding Huffman code, most significant bit first. When DIFF is positive, the SSSS low order bits of DIFF are appended. When DIFF is negative, the SSSS low order bits of (DIFF - 1) are appended. Note that the most significant bit of the appended bit sequence is 0 for negative differences and 1 for positive differences.

F.1.2.1.2 Defining Huffman tables for the DC coefficients

The syntax for specifying the Huffman tables is given in Annex B. The procedure for creating a code table from this information is described in Annex C. No more than two Huffman tables may be defined for coding of DC coefficients. Two examples of Huffman tables for coding of DC coefficients are provided in Annex K.

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Table F.1 – Difference magnitude categories for DC coding

SSSS	DIFF values
0	0
1	-1,1
2	-3,-2,2,3
3	-7,-4,4,7
4	-15,-8,8,15
5	-31,-16,16,31
6	-63,-32,32,63
7	-127,-64,64,127
8	-255,-128,128,255
9	-511,-256,256,511
10	-1 023,-512,512,1 023
11	-2 047,-1 024,1 024,2 047

F.1.2.1.3 Huffman encoding procedures for DC coefficients

The encoding procedure is defined in terms of a set of extended tables, XHUFDC and XHUFSL, which contain the complete set of Huffman codes and sizes for all possible difference values. For full 12-bit precision the tables are relatively large. For the baseline system, however, the precision of the differences may be small enough to make this description practical.

XHUFDC and XHUFSL are generated from the encoder tables EHUFDC and EHUFSL (see Annex C) by appending to the Huffman codes for each difference category the additional bits that completely define the difference. By definition, XHUFDC and XHUFSL have entries for each possible difference value. XHUFDC contains the concatenated bit pattern of the Huffman code and the additional bits field; XHUFSL contains the total length in bits of this concatenated bit pattern. Both are indexed by DIFF, the difference between the DC coefficient and the prediction.

The Huffman encoding procedure for the DC difference, DIFF, is:

SIZE = XHUFSL(DIFF)

CODE = XHUFDC(DIFF)

code SIZE bits of CODE

where DC is the quantized DC coefficient value and PRED is the predicted quantized DC value. The Huffman code (CODE) (including any additional bits) is obtained from XHUFDC and SIZE (length of the code including additional bits) is obtained from XHUFSL, using DIFF as the index to the two tables.

F.1.2.2 Huffman encoding of AC coefficients

F.1.2.2.1 Structure of AC code table

Each non-zero AC coefficient in ZZ is described by a composite 8-bit value, RS, of the form

RS = binary "RRRRSSSS"

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The 4 least significant bits, 'SSSS', define a category for the amplitude of the next non-zero coefficient in ZZ, and the 4 most significant bits, 'RRRR', give the position of the coefficient in ZZ relative to the previous non-zero coefficient (i.e. the run-length of zero coefficients between non-zero coefficients). Since the run length of zero coefficients may exceed 15, the value 'RRRRSSSS' = 'X'F0' is defined to represent a run length of 15 zero coefficients followed by a coefficient of zero amplitude. (This can be interpreted as a run length of 16 zero coefficients.) In addition, a special value 'RRRRSSSS' = '00000000' is used to code the end-of-block (EOB), when all remaining coefficients in the block are zero.

The general structure of the code table is illustrated in Figure F.1. The entries marked "N/A" are undefined for the baseline procedure.

		SSSS										
		0	1	2	.	.	.	9	10			
RRRR	0	EOB	COMPOSITE VALUES									
	.	N/A										
	.	N/A										
	15	ZRL										

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Figure F.1 - Two-dimensional value array for Huffman coding

The magnitude ranges assigned to each value of SSSS are defined in Table F.2.

Table F.2 - Categories assigned to coefficient values

SSSS	0	AC coefficients
1	0	-1,1
2		-3,-2,2,3
3		-7,-4,4,7
4		-15,-8,8,15
5		-31,-16,16,31
6		-63,-32,32,63
7		-127,-64,64,127
8		-255,-128,128,255
9		-511,-256,256,511
10	0	-1 023,-512,512,1 023

The composite value, RRRSSSS, is Huffman coded and each Huffman code is followed by additional bits which specify the sign and exact amplitude of the coefficient.

The AC code table consists of one Huffman code (maximum length 16 bits, not including additional bits) for each possible composite value. The Huffman codes for the 8-bit composite values are generated in such a way that no code consists entirely of 1-bits.

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The format for the additional bits is the same as in the coding of the DC coefficients. The value of SSSS gives the number of additional bits required to specify the sign and precise amplitude of the coefficient. The additional bits are either the low-order SSSS bits of ZZ(K) when ZZ(K) is positive or the low-order SSSS bits of ZZ(K) - 1 when ZZ(K) is negative. ZZ(K) is the Kth coefficient in the zig-zag sequence of coefficients being coded.

F.1.2.2.2 Defining Huffman tables for the AC coefficients

The syntax for specifying the Huffman tables is given in Annex B. The procedure for creating a code table from this information is described in Annex C.

In the baseline system no more than two Huffman tables may be defined for coding of AC coefficients. Two examples of Huffman tables for coding of AC coefficients are provided in Annex K.

F.1.2.2.3 Huffman encoding procedures for AC coefficients

As defined in Annex C, the Huffman code table is assumed to be available as a pair of tables, EHUFEO (containing the code bits) and EHUFSL (containing the length of each code in bits), both indexed by the composite value defined above.

The procedure for encoding the AC coefficients in a block is shown in Figures F.2 and F.3. In Figure F.2, K is the index to the zig-zag scan position and R is the run length of zero coefficients.

The procedure "Append EHUFSL(X'F0') bits of EHUFEO(X'F0')" codes a run of 16 zero coefficients (ZRL code of Figure F.1). The procedure "Code EHUFSL(0) bits of EHUFEO(0)" codes the end-of-block (EOB code). If the last coefficient (K = 63) is not zero, the EOB code is bypassed.

CSIZE is a procedure which maps an AC coefficient to the SSSS value as defined in Table F.2.

F.1.2.3 Byte stuffing

In order to provide code space for marker codes which can be located in the compressed image data without decoding, byte stuffing is used.

Whenever, in the course of normal encoding, the byte value X'FF' is created in the code string, a X'00' byte is stuffed into the code string.

If a X'00' byte is detected after a X'FF' byte, the decoder must discard it. If the byte is not zero, a marker has been detected, and shall be interpreted to the extent needed to complete the decoding of the scan.

Byte alignment of markers is achieved by padding incomplete bytes with 1-bits. If padding with 1-bits creates a X'FF' value, a zero byte is stuffed before adding the marker.

F.1.3 Extended sequential DCT-based Huffman encoding process for 8-bit sample precision

This process is identical to the Baseline encoding process described in F.1.2, with the exception that the number of sets of Huffman table destinations which may be used within the same scan is increased to four. Four DC and four AC Huffman table destinations is the maximum allowed by this Specification.

F.1.4 Extended sequential DCT-based arithmetic encoding process for 8-bit sample precision

This subclause describes the use of arithmetic coding procedures in the sequential DCT-based encoding process.

NOTE - The arithmetic coding procedures in this Specification are defined for the maximum precision to encourage interchangeability.

The arithmetic coding extensions have the same DCT model as the Baseline DCT encoder. Therefore, Annex F.1.1 also applies to arithmetic coding. As with the Huffman coding technique, the binary arithmetic coding technique is lossless. It is possible to transcode between the two systems without either FDCT or IDCT computations, and without modification of the reconstructed image.

The basic principles of adaptive binary arithmetic coding are described in Annex D. Up to four DC and four AC conditioning table destinations and associated statistics areas may be used within one scan.

The arithmetic encoding procedures for encoding binary decisions, initializing the statistics area, initializing the encoder, terminating the code string, and adding restart markers are listed in Table D.1 of Annex D.

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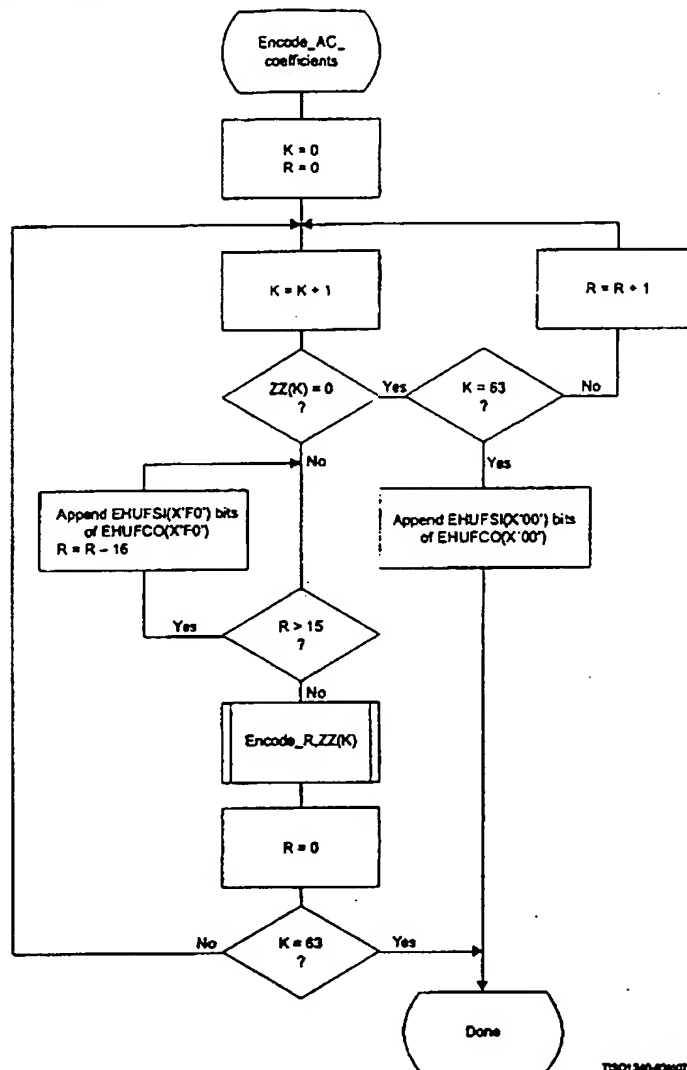
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Figure F.2 – Procedure for sequential encoding of AC coefficients with Huffman coding

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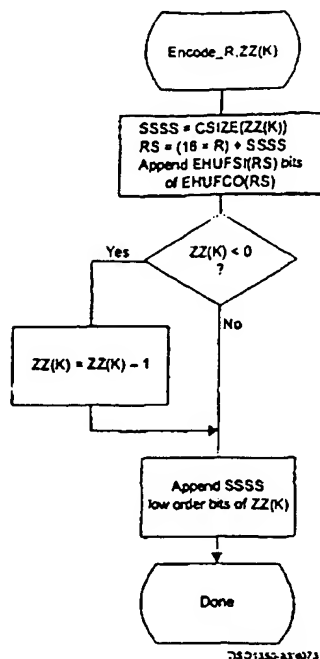


Figure F.3 – Sequential encoding of a non-zero AC coefficient

Some of the procedures in Table D.1 are used in the higher level control structure for scans and restart intervals described in Annex E. At the beginning of scans and restart intervals, the probability estimates used in the arithmetic coder are reset to the standard initial value as part of the Initenc procedure which restarts the arithmetic coder. At the end of scans and restart intervals, the Flush procedure is invoked to empty the code register before the next marker is appended.

F.1.4.1 Arithmetic encoding of DC coefficients

The basic structure of the decision sequence for encoding a DC difference value, DIFF, is shown in Figure F.4.

The context-index S_0 and other context-indices used in the DC coding procedures are defined in Table F.4 (see F.1.4.4.1.3). A 0-decision is coded if the difference value is zero and a 1-decision is coded if the difference is not zero. If the difference is not zero, the sign and magnitude are coded using the procedure Encode_V(S_0), which is described in F.1.4.3.1.

F.1.4.2 Arithmetic encoding of AC coefficients

The AC coefficients are coded in the order in which they occur in the zig-zag sequence $ZZ(1, \dots, 63)$. An end-of-block (EOB) binary decision is coded before coding the first AC coefficient in ZZ , and after each non-zero coefficient. If the EOB occurs, all remaining coefficients in ZZ are zero. Figure F.5 illustrates the decision sequence. The equivalent procedure for the Huffman coder is found in Figure F.2.

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		SSSS												
		0	1	2	...	13	14							
RRRR	0	EOB	COMPOSITE VALUES											
	.	N/A												
	.	N/A												
	15	ZRL												

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Figure F.11 – Two-dimensional value array for Huffman coding

Table F.7 – Values assigned to coefficient amplitude ranges

SSSS	AC coefficients
11	-2 047...-1 024, 1 024...2 047
12	-4 095...-2 048, 2 048...4 095
13	-8 191...-4 096, 4 096...8 191
14	-16 383...-8 192, 8 192...16 383

F.1.6 Extended sequential DCT-based arithmetic encoding process for 12-bit sample precision

The process is identical to the sequential DCT process for 8-bit precision except for changes in the precision of the FDCT computation.

The structure of the encoding procedure is identical to that specified in F.1.4 which was already defined for a 12-bit sample precision.

F.2 Sequential DCT-based decoding processes

F.2.1 Sequential DCT-based control procedures and coding models

F.2.1.1 Control procedures for sequential DCT-based decoders

The control procedures for decoding compressed image data and its constituent parts – the frame, scan, restart interval and MCU – are given in Figures E.6 to E.10. The procedure for decoding a MCU (Figure E.10) repetitively calls the procedure for decoding a data unit. For DCT-based decoders the data unit is an 8 × 8 block of samples.

F.2.1.2 Procedure for decoding an 8 × 8 block data unit

In the sequential DCT-based decoding process, decoding an 8 × 8 block data unit consists of the following procedures:

- decode DC coefficient for 8 × 8 block using the DC table destination specified in the scan header;
- decode AC coefficients for 8 × 8 block using the AC table destination specified in the scan header;
- dequantize using table destination specified in the frame header and calculate the inverse 8 × 8 DCT.

F.2.1.3 Decoding models for the sequential DCT procedures

Two decoding procedures are used, one for the DC coefficient ZZ(0) and the other for the AC coefficients ZZ(1)...ZZ(63). The coefficients are decoded in the order in which they occur in the zig-zag sequence order, starting with the DC coefficient. The coefficients are represented as two's complement integers.

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F.2.1.3.1 Decoding model for DC coefficients

The decoded difference, DIFF, is added to PRED, the DC value from the most recently decoded 8×8 block from the same component. Thus $ZZ(0) = PRED + DIFF$.

At the beginning of the scan and at the beginning of each restart interval, the prediction for the DC coefficient is initialized to zero.

F.2.1.3.2 Decoding model for AC coefficients

The AC coefficients are decoded in the order in which they occur in ZZ. When the EOB is decoded, all remaining coefficients in ZZ are initialized to zero.

F.2.1.4 Dequantization of the quantized DCT coefficients

The dequantization of the quantized DCT coefficients as described in Annex A, is accomplished by multiplying each quantized coefficient value by the quantization table value for that coefficient. The decoder shall be able to use up to four quantization table destinations.

F.2.1.5 Inverse DCT (IDCT)

The mathematical definition of the IDCT is given in A.3.3.

After computation of the IDCT, the signed output samples are level-shifted, as described in Annex A, converting the output to an unsigned representation. For 8-bit precision the level shift is performed by adding 128. For 12-bit precision the level shift is performed by adding 2 048. If necessary, the output samples shall be clamped to stay within the range appropriate for the precision (0 to 255 for 8-bit precision and 0 to 4 095 for 12-bit precision).

F.2.2 Baseline Huffman Decoding procedures

The baseline decoding procedure is for 8-bit sample precision. The decoder shall be capable of using up to two DC and two AC Huffman tables within one scan.

F.2.2.1 Huffman decoding of DC coefficients

The decoding procedure for the DC difference, DIFF, is:

T = DECODE

DIFF = RECEIVE(T)

DIFF = EXTEND(DIFF, T)

where DECODE is a procedure which returns the 8-bit value associated with the next Huffman code in the compressed image data (see F.2.2.3) and RECEIVE(T) is a procedure which places the next T bits of the serial bit string into the low order bits of DIFF, MSB first. If T is zero, DIFF is set to zero. EXTEND is a procedure which converts the partially decoded DIFF value of precision T to the full precision difference. EXTEND is shown in Figure F.12.

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//
// :
//
// : dc : data unit in a sequential scan.
//
// P :
//
// : coded that owns this component
// The row and column for this data unit.
//
//
void JpegDecoderComponent::DecodeSequential (JpegDecoder &decoder,
unsigned int mcurow,
unsigned int mcucol)
{
    JpegDecoderCoefficientBlock data;
    memset (&data, 0, sizeof (data));

    // Decode the DC difference value.
    // Section F.2.2.2 Figure F.11
    unsigned int count; // called Q in F.2.2.1
    count = dc_table->Decode (decoder);
    int bits = decoder.Receive (count); // ✓
    int diff = Extend (bits, count); // ✓

    // Create the DC value from the difference and the previous DC value.
    int dc = diff + last_dc_value;
    last_dc_value = dc;
    data [0][0] = dc;

    // Decode the AC coefficients.
    // Section F.2.2.2 Figure F.11
    for (unsigned int kk = 1; kk < JpegSampleSize; ++ kk)
    {
        UBYTE2 rrrr = ac_table->Decode (decoder);
        UBYTE2 ssss = (UBYTE2) (rrr & 0xF);
        UBYTE2 rrrr = (UBYTE2) (rrr >> 0x4);

        if (ssss == 0)
        {
            // ssss is zero then rrrr should either be 15 or zero according
            // Figure F.1. 0 means that the rest of the coefficients are zero.
            // while 15 means that the next 16 coefficients are zero. We are not
            // for other values because Figure F.13 shows values other than
            // as being treated as zero.
            if (rrrr != 15)
                break;
            kk += 15; // Actually 16 since one more gets added by the loop
        }
        else
        {
            // If ssss is non-zero then rrrr gives the number of zero coeff
            // to skip.

            kk += rrrr;
            if (kk >= JpegSampleSize)
                throw EJPEGFatal ("Value out of range");

            // Receive and extend the additional bits.
            // Section F.2.2.2 Figure F.11
            int bits = decoder.Receive (ssss);
            int value = Extend (bits, ssss);
            (&data [0][0])[JpegZigzagInputOrder (kk)] = value;
        }
    }

    data_unit [mcurow * du_cols + mcucol].InverseDCT (data,
        *quantization_table);
    return;
}

```

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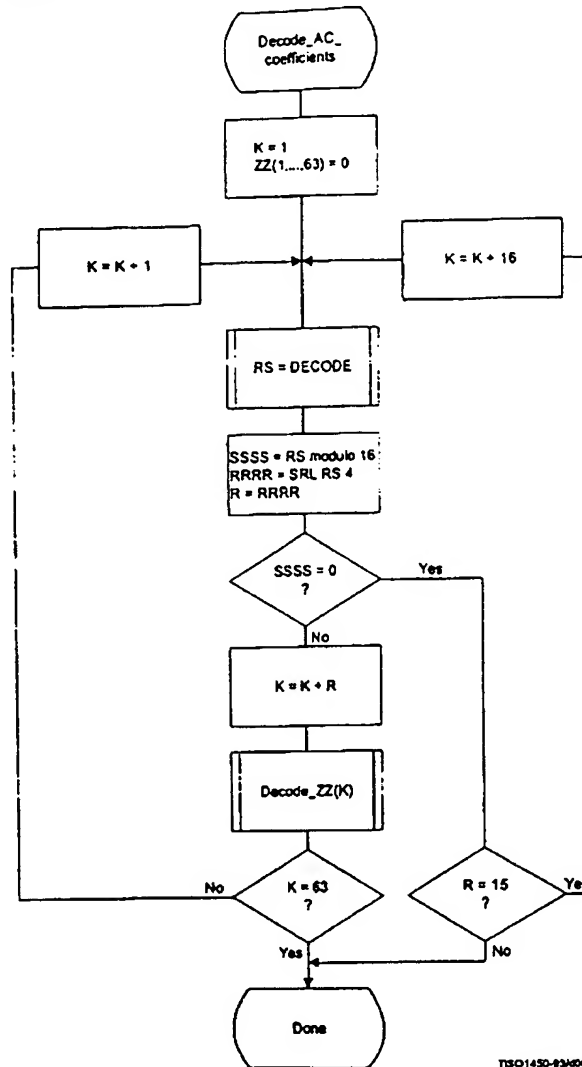


Figure F.13 – Huffman decoding procedure for AC coefficients

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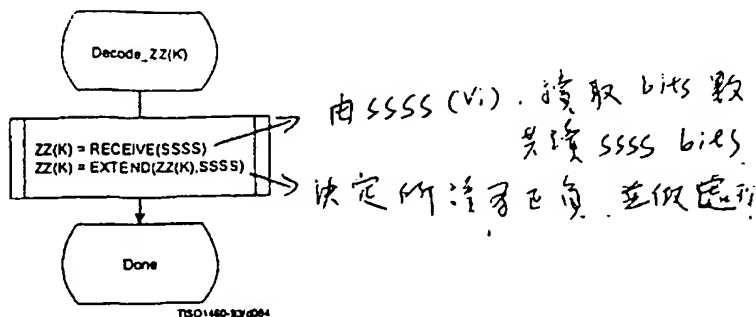


Figure F.14 – Decoding a non-zero AC coefficient

The decoding of the amplitude and sign of the non-zero coefficient is done in the procedure "Decode_ZZ(K)", shown in Figure F.14.

DECODE is a procedure which returns the value, RS, associated with the next Huffman code in the code stream (see F.2.2.3). The values SSSS and R are derived from RS. The value of SSSS is the four low order bits of the composite value and R contains the value of RRRR (the four high order bits of the composite value). The interpretation of these values is described in F.1.2.2. EXTEND is shown in Figure F.12.

F.2.2.3 The DECODE procedure

The DECODE procedure decodes an 8-bit value which, for the DC coefficient, determines the difference magnitude category. For the AC coefficient this 8-bit value determines the zero run length and non-zero coefficient category.

Three tables, HUFFVAL, HUFFCODE, and HUFFSIZE, have been defined in Annex C. This particular implementation of DECODE makes use of the ordering of the Huffman codes in HUFFCODE according to both value and code size. Many other implementations of DECODE are possible.

NOTE – The values in HUFFVAL are assigned to each code in HUFFCODE and HUFFSIZE in sequence. There are no ordering requirements for the values in HUFFVAL which have assigned codes of the same length.

The implementation of DECODE described in this subclause uses three tables, MINCODE, MAXCODE and VALPTR, to decode a pointer to the HUFFVAL table. MINCODE, MAXCODE and VALPTR each have 16 entries, one for each possible code size. MINCODE(I) contains the smallest code value for a given length I. MAXCODE(I) contains the largest code value for a given length I, and VALPTR(I) contains the index to the start of the list of values in HUFFVAL which are decoded by code words of length I. The values in MINCODE and MAXCODE are signed 16-bit integers; therefore, a value of -1 sets all of the bits.

The procedure for generating these tables is shown in Figure F.15. The procedure for DECODE is shown in Figure F.16. Note that the 8-bit "VALUE" is returned to the procedure which invokes DECODE.

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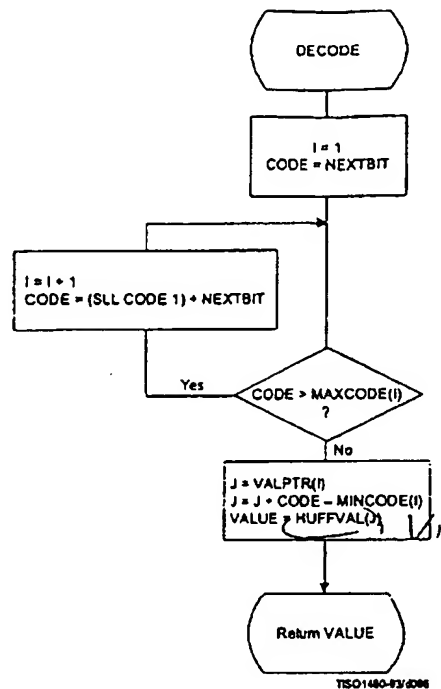


Figure F.16 – Procedure for DECODE

$T = \text{DECODE}$

由 $\text{Bistream} \rightarrow$ 找出对应 V_i

$\Rightarrow T = \text{DECODE} = V_i$

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F.2.2.4 The RECEIVE procedure

RECEIVE(SSSS) is a procedure which places the next SSSS bits of the entropy-coded segment into the low order bits of DIFF, MSB first. It calls NEXTBIT and it returns the value of DIFF to the calling procedure (see Figure F.17).

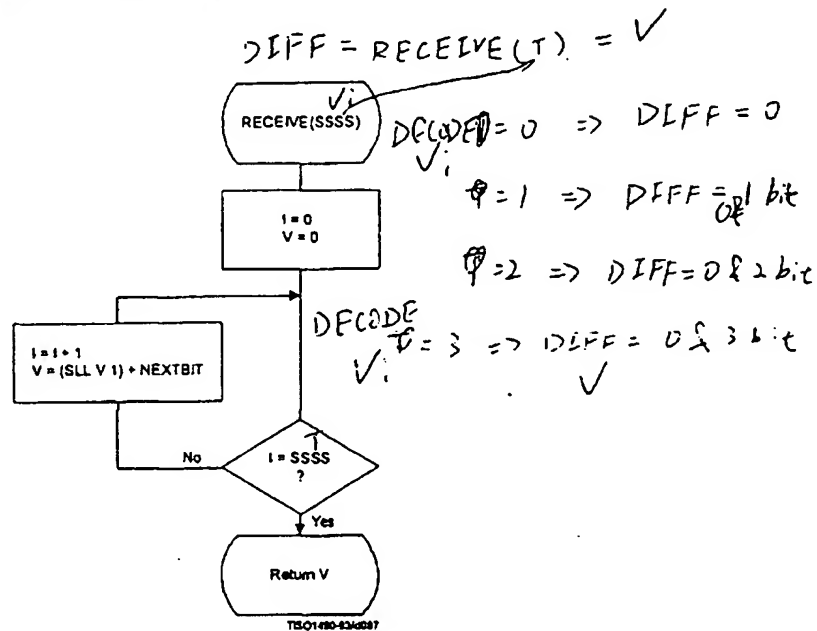


Figure F.17 - Procedure for RECEIVE(SSSS)

F.2.2.5 The NEXTBIT procedure

NEXTBIT reads the next bit of compressed data and passes it to higher level routines. It also intercepts and removes stuff bytes and detects markers. NEXTBIT reads the bits of a byte starting with the MSB (see Figure F.18).

Before starting the decoding of a scan, and after processing a RST marker, CNT is cleared. The compressed data are read one byte at a time, using the procedure NEXTBYTE. Each time a byte, B, is read, CNT is set to 8.

The only valid marker which may occur within the Huffman coded data is the RST_n marker. Other than the EOI or markers which may occur at or before the start of a scan, the only marker which can occur at the end of the scan is the DNL (define-number-of-lines).

Normally, the decoder will terminate the decoding at the end of the final restart interval before the terminating marker is intercepted. If the DNL marker is encountered, the current line count is set to the value specified by that marker. Since the DNL marker can only be used at the end of the first scan, the scan decode procedure must be terminated when it is encountered.

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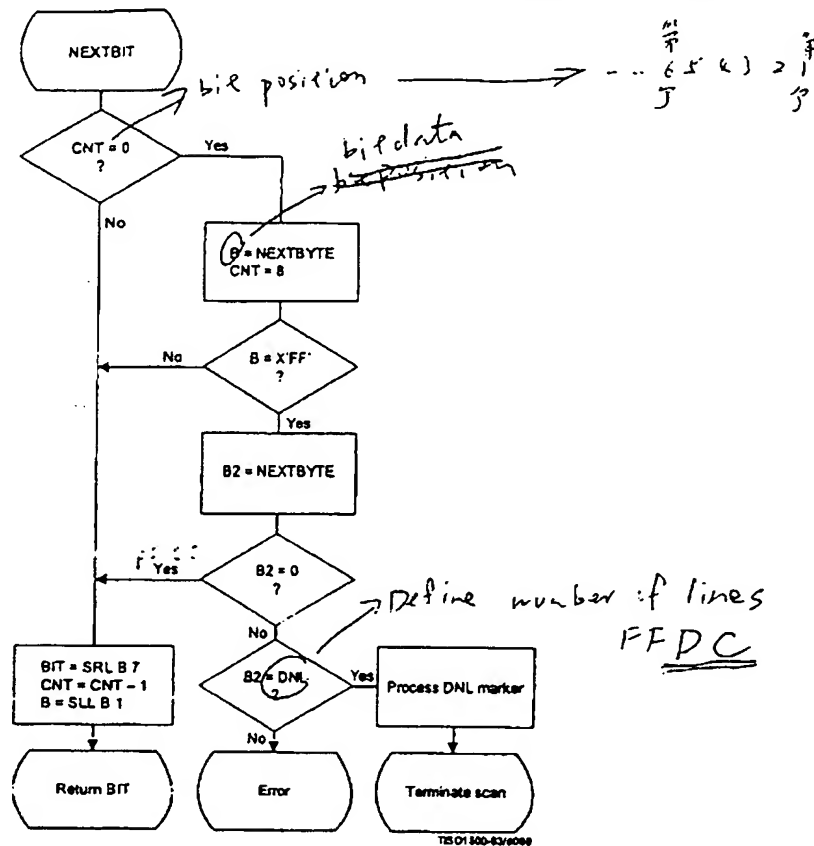


Figure F.18 – Procedure for fetching the next bit of compressed data

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TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000582

Subject: _____

File: D:\Install\Compressed Image File Formats\Examples\c08\src\jpegdeco.cpp 19
98/12/22, 08:52:22PM

```
//
// Description:
//
// This function returns the next raw bit in the input stream.
//
// Bits are read from high order to low.
//
// Return Value:
//
// The next bit (0, 1)
//
// This function returns the next bit in the input stream.
int JpegDecoder::NextBit ()
{
    // Section F.2.2.5 Figure F.18.
    // CNT is called bitposition
    // is called bitdata
    if (bit_position == 0)
    {
        // We are out of data so read the next byte from the input stream.
        input_stream->read ((char *) &bit_data, sizeof (bit_data)) ;
        if (!input_stream->eof ())
            throw EjpegBadData ("Premature end of file") ;
        // Reset the bit read position starting with the highest order bit. We
        // read high to low.
        bit_position = CHAR_BIT * sizeof (bit_data)
        if (bit_data == 0xFF)
        {
            // 0xFF could start a marker. The sequence 0xFF, 0x00 is used to
            // to represent the value 0xFF. The only other marker that is legal
            // at this point is a DNL marker.
            UBYTE1 b2 ;
            input_stream->read ((char *) &b2, 1) ;
            if (!input_stream->eof ())
                throw EjpegBadData ("Premature end of file") ;
            if (b2 != 0)
            {
                if (b2 == DNL)
                {
                    // DNL markers should not occur within the supported frame types.
                    throw EjpegBadData ("Unexpected Marker DNL") ;
                }
                else
                {
                    throw EjpegBadData ("Unexpected Marker") ;
                }
            }
        }
    }

    // Consume one bit of the input.
    -- bit_position ;
    // Shift the value to the low order bit position.
    UBYTE1 result = (UBYTE1) ((bit_data >> bit_position) & 1) ;
    return result ;
}
```

in compressed data.

bit counter

current byte is input stream

读入的字节 8 (CNT)

取最左之1位

Disclosed To And Understood By Me

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Name	Date
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Name	Date

Signature: blair

Date: 2000/1/12

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000583

17128

object:

```

// Description:
// This function reads a Huffman table from the input stream. A DHT
// marker can define more than one Huffman table. This function reads
// just one of those tables.
//
// Parameters:
// decoder: The JPEG decoder that owns the Huffman table
//
// Return Value:
// The size of the Huffman table in the input stream
// (the number of bytes read).
//
unsigned int JpegHuffmanDecoder::ReadTable (JpegDecoder &decoder)
{
    // We declare this here because MSVC++ does not handle for
    // statement scoping rules correctly.
    unsigned int jj;

    // B.2.4.2
    unsigned int huffbits (JpegMaxHuffmanCodeLength);

    unsigned int count = 0; // Count of codes in the Huffman table.

    // Read the 16 1-byte length counts and count the number of
    // codes in the table.
    for (jj = 0; jj < JpegMaxHuffmanCodeLength; ++ jj)
    {
        // These values are called huffbits in the standard.
        // huffbits [jj] = decoder.ReadByte ();
        count = huffbits [jj]; cal count 128
        if (count > JpegMaxNumberOfHuffmanCodes)
            throw JpegData ("Huffman count > 256");

        // Read the Huffman values.
        for (jj = 0; jj < count; ++ jj)
        {
            // These values are called huff values in the standard.
            huff values [jj] = decoder.ReadByte ();
        }

        // Generate the Structures for Huffman Encoding.
        MakeTable ("huffbits");

        table_defined = true; // This table can now be used.

        return JpegMaxHuffmanCodeLength + count;
    }
}

// Description:
//
// This function generates the data used for Huffman decoding.
//
// The implicit outputs are the member variables mincode [n],
// maxcode [n] and valptr [n]. These are the minimum Huffman Code of
// length n-1, the maximum Huffman Code of length n+1, and the index
// into huff_values [i] for the first value with a Huffman code of length
// n+1.
//
// Parameters:
// huffbits: The count of Huffman codes of length n+1
//
void JpegHuffmanDecoder::MakeTable (unsigned int huffbits (JpegMaxHuffmanCodeLength))
{
    // We have to declare the loop indices here because MSVC++ does not
    // handle scoping in for statements correctly.
    unsigned int ii, jj, kk;

    // These values in these arrays correspond to the elements of the
    // "values" array. The Huffman code for values [N] is huffcodes [N]
    // and the length of the code is huffsizes [N].
    unsigned int huffcodes (JpegMaxNumberOfHuffmanCodes);
    unsigned int huffsizes (JpegMaxNumberOfHuffmanCodes + 1);

    // Section 3.1.1.1.1.1
    // Convert the array huffbits into an array containing the count of codes
    // of each length. huffbits [jj] = decoder.ReadByte ();
    // huffbits [jj] = decoder.ReadByte ();
    // huffbits [jj] = decoder.ReadByte ();
    // huffbits [jj] = decoder.ReadByte ();
    for (ii = 0, kk = 0; ii < JpegMaxHuffmanCodeLength; ++ ii)
    {
        for (int jj = 0; jj < huffbits [ii]; ++ jj)
        {
            huffsizes [kk] = ii + 1;
            ++ kk;
        }
        huffsizes [kk] = 0;
    }
}

```

closed To And Understood By Me

_____ Name	_____ Date
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Signature: Uair
 Date: 2005/5/11

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
 SUBJECT TO PROTECTIVE ORDER

TR000584

Subject: _____

```

// Section C.2 Figure C.2
// Calculate the Huffman code for each Huffman value.
UBYTE2 code = 0 ;
unsigned int si ;
for (kk = 0, si = huffsizes [0] ;
    huffsizes [kk] != 0 ;
    ++ si, code <= 1)
{
    for ( ; huffsizes [kk] == si ; ++ code, ++ kk)
    {
        huffcodes [kk] = code ;
    }
}

// Section F.2.2. Figure F.13
// Create three arrays.
// mincode [n] : The smallest Huffman code of length n + 1.
// maxcode [n] : The largest Huffman code of length n + 1.
// valptr [n] : Index into the values array. First value with a code
//               of length n + 1.
for (ii=0, jj=0 ; ii < JpegMaxHuffmanCodeLength ; ++ ii) for i ~ 16
{
    // ii is the index into Huffman code lengths
    // jj is the index into Huffman code values
    if (huffbits [ii] != 0)
    {
        // The jj'th Huffman value is the first with a Huffman code
        // of length ii.
        valptr [ii] = jj ;
        mincode [ii] = huffcodes [jj] ;
        jj += huffbits [ii] ;
        maxcode [ii] = huffcodes [jj - 1] ;
    }
    else
    {
        // There are no Huffman codes of length (ii + 1).
        maxcode [ii] = -1 ;
        // An illegal value > maxcode[]
        mincode [ii] = JpegMaxNumberofHuffmanCodes + 1 ;
        valptr [ii] = 0 ;
    }
}
return ;

//
// Description:
//
// This function decodes the next Huffman-encoded value in the input
// stream.
//
// Parameters:
// decoder: The JPEG decoder that owns the Huffman table.

//
int JpegHuffmanDecoder::Decode (JpegDecoder &decoder)
{
    // This function decodes the next byte in the input stream using this
    // Huffman table.
    // Section A F.2.2.3 Figure F.16
    UBYTE2 code = decoder.NextBit () ;
    int codelength ; // Called l in the standard.

    // Here we are taking advantage of the fact that 1 bits are used as
    // a prefix to the longer codes.
    for (codelength = 0 ;
        (code > maxcode [codelength]) && codelength <
        JpegMaxHuffmanCodeLength) ;
        ++ codelength)
    {
        code = (UBYTE2) ((code << 1) | decoder.NextBit ()) ;
    }

    if (codelength >= JpegMaxHuffmanCodeLength)
        throw EjpegBadData ("Bad Huffman Code Length") ;

    // Now we have a Huffman code of length (codelength + 1) that
    // is somewhere in the range
    // mincode [codelength]...maxcode [codelength].

    // This code is the (offset + 1)'th code of (codelength + 1) ;
    int offset = code - mincode [codelength] ;

    // valptr [codelength] is the first code of length (codelength + 1)
    // so now we can look up the value for the Huffman code in the table.
    int index = valptr [codelength] + offset ;
    return huff_values [index] ;
}

```

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Signature: _____

Date: _____

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000585

17100
subject: gamma correction source code sendy

- gama_corret : gamma correction
- designer : Albert Wang
- description : a lookup table is used for gamma correction that includes
- 1. gamma correct lookup table initialization via I2C
- 2. panel data is processed via lookup table for gamma correct
- 3. bypass gamma correction
- Group delay = 2 oclk for gamma correction
- Date : Aug 02 1998 first creation
- Version : 2.0
- History : Sep 23 1992
- replace tsmc sram with artisan sram
- Oct. 28 1999
- replace 256x8 with 256x10

library ieee;
use ieee.std_logic_1164.all;
use ieee.std_logic_unsigned.all;

pragma translate_off
-library scaling_lib;
library tsmc_macro_025_lib ;
-use scaling_lib.scaling_components_pkg.all;
-pragma translate_on

escalade_ports -begin
entity gc_top is
port (rstn : in std_logic;
pclk : in std_logic;
pvs : in std_logic;
IIC_DIRW : in std_logic;
GC_use : in std_logic;
rgb_in : in std_logic_vector(23 downto 0);
~~host_ibus~~ : in std_logic_vector(17 downto 0);
softzero : in std_logic;
tis : in std_logic;
tms : in std_logic;
TC : in std_logic;
TD_GC_F : in std_logic;
TD_GC : in std_logic_vector(1 downto 0);
TQ_GC : out std_logic_vector(1 downto 0);
TQ_GC_F : out std_logic;
TD_LUT : in std_logic_vector(2 downto 0);
TQ_LUT : out std_logic_vector(2 downto 0);
CLUT_ALPHA : out std_logic_vector(3 downto 0);
end entity gc_top;
end escalade_ports -begin

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_____ Name	_____ Date	Signature: <u>blair</u>
_____ Name	_____ Date	Date: <u>2001/5/15</u>

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000586

Subject: _____

17131

```
RCAB_CBUS : out std_logic_vector(15 downto 0);
GCAB_CBUS : out std_logic_vector(15 downto 0);
BCAB_CBUS : out std_logic_vector(15 downto 0);
DEDIM_LIGHT : out std_logic_vector(3 downto 0);
DM_V_ASTART : out std_logic_vector(10 downto 0);
DM_V_AEND : out std_logic_vector(10 downto 0);
DM_H_ASTART : out std_logic_vector(10 downto 0);
DM_H_AEND : out std_logic_vector(10 downto 0);
LUT_CBUS : out std_logic_vector(8 downto 0);
rgb_out : out std_logic_vector(29 downto 0));
```

ARCHITECTURE BEHAVIORAL OF gc_top IS

COMPONENT gamma_correct

```
PORT (
    rstn      : in  std_logic;    -- reset signal
    PClk      : in  std_logic;    -- panel clock
    GC_tbl_write : in  std_logic;  -- I2C GC_tbl write pulse from host_if
    GC_value   : in  std_logic_vector(7 downto 0); -- GC initial value fr
    host_if    : in  std_logic;    -- use gamma_correction from hostif
    Data_in    : in  std_logic_vector(7 downto 0); -- panel input data fr
    scaling    : in  std_logic;    -- use gamma_correction from hostif
    GC_tbl_out  : in  std_logic_vector(9 downto 0); -- GC table data output
    GC_tbl_in   : out std_logic_vector(9 downto 0); -- input data for GC t
    GC_tbl_addr : out std_logic_vector(7 downto 0); -- GC_tbl address
    GC_tbl_ceb  : out std_logic;    -- ramceb for GC table
    GC_tbl_web  : out std_logic;    -- ramweb for GC table
    GC_tbl_clk  : out std_logic;    -- ramclk for GC table
    Data_out    : out std_logic_vector(9 downto 0) -- panel data out
);
```

END COMPONENT;

COMPONENT sram 256x10

```
PORT (
    in1      : in  std_logic_vector(9 downto 0); -- data input
    clk      : in  std_logic;    -- clock input
    cen      : in  std_logic;    -- chip enable
    oen      : in  std_logic;    -- output enable
    wen      : in  std_logic;    -- write enable
    a        : in  std_logic_vector(7 downto 0); -- address
    tis      : in  std_logic;    -- test input select; from tcb test_act
    tms      : in  std_logic;    -- test mode select; from tc
    tqoen    : in  std_logic;    -- test data output drive enable; from
    serial_in : in  std_logic;    -- test data input
    out1     : out std_logic_vector(9 downto 0); -- data output
    serial_out : out std_logic;   -- test data output
);
```

END COMPONENT;

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Name	Date
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Signature: <u>blair</u>
Date: <u>2021/5/15</u>

17132

Subject: _____

COMPONENT delay comp

PORT (

```

pclk      : in  std_logic;    -- panel clock
phs       : in  std_logic;    -- panel H_sync
ph_active : in  std_logic;    -- panel horizontal active
pde       : in  std_logic;    -- panel horizontal display enable
pvs       : in  std_logic;    -- panel V_sync
pv_active : in  std_logic;    -- panel vertical active
pvde      : in  std_logic;    -- panel vertical display enable
phs_out   : out std_logic;    -- panel H_sync output
ph_active_out: out std_logic; -- panel horizontal active output
pde_out   : out std_logic;    -- panel horizontal display enable outp

```

```

pvs_out   : out std_logic;    -- panel V_sync output
pv_active_out: out std_logic; -- panel vertical active output
pvde_out  : out std_logic;    -- panel vertical display enable output

```

60-p: host interface

PORT

```

CLK       : in  std_logic;
RSTN      : in  std_logic;
SZERO     : in  std_logic;
IIC_DIRW  : in  std_logic;
PVS       : in  std_logic;
RCAB_CBUS : out  std_logic_vector(15 downto 0);
GCAB_CBUS : out  std_logic_vector(15 downto 0);
BCAB_CBUS : out  std_logic_vector(15 downto 0);
DEDIM_LIGHT : out std_logic_vector(3 downto 0);
CLUT_ALPHA : out std_logic_vector(3 downto 0);
DM_V_ASTART : out std_logic_vector(10 downto 0);
DM_V_AEND   : out std_logic_vector(10 downto 0);
DM_H_ASTART : out std_logic_vector(10 downto 0);
DM_H_AEND   : out std_logic_vector(10 downto 0);
LUT_CBUS    : out std_logic_vector(8 downto 0);
GC_CBUS     : out std_logic_vector(10 downto 0);
HOST_IBUS   : in  std_logic_vector(17 downto 0));

```

IF COMPONENT;

host interface

```

gnal gc_cbus      : std_logic_vector(10 downto 0);
gnal data_value   : std_logic_vector(7 downto 0);
gnal grwaddr_write : std_logic;
gnal ggwaddr_write : std_logic;
gnal gowaddr_write : std_logic;

```

gamma correction for r input

Disclosed To And Understood By Me

Name

Date

Signature: o/siv

Name

Date

Date: 2001/5/18

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000588

Subject: _____

```

signal r_gc_out      : std_logic_vector(9 downto 0);
signal r_gc_in       : std_logic_vector(9 downto 0);
signal r_gc_addr     : std_logic_vector(7 downto 0);
signal r_gc_ceb      : std_logic;
signal r_gc_web      : std_logic;
signal r_gc_clk      : std_logic;

```

```

---
-- gamma correction for g input

```

```

---
signal g_gc_out      : std_logic_vector(9 downto 0);
signal g_gc_in       : std_logic_vector(9 downto 0);
signal g_gc_addr     : std_logic_vector(7 downto 0);
signal g_gc_ceb      : std_logic;
signal g_gc_web      : std_logic;
signal g_gc_clk      : std_logic;

```

```

---
-- gamma correction for b input

```

```

---
signal b_gc_out      : std_logic_vector(9 downto 0);
signal b_gc_in       : std_logic_vector(9 downto 0);
signal b_gc_addr     : std_logic_vector(7 downto 0);
signal b_gc_ceb      : std_logic;
signal b_gc_web      : std_logic;

```

```

---
-- Host interface part; decode I2C address and data

```

```

l_host_gc: hostif_gc

```

```

  GENERIC MAP

```

```

    (
      ADDR_SIZE => 8,
      DATA_SIZE => 8
    )

```

```

  PORT MAP

```

```

    (
      CLK      => pclk,
      RSTN     => rstn,
      SZERO    => softzero,
      IIC_DIRW => IIC_DIRW,
      PVS      => pvs,
      RCAB_CBUS => RCAB_CBUS,
      GCAB_CBUS => GCAB_CBUS,
      BCAB_CBUS => BCAB_CBUS,
      DEDIM_LIGHT => DEDIM_LIGHT,
      CLUT_ALPHA => CLUT_ALPHA,

```

Disclosed To And Understood By Me

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Name	Date

Signature: blair

Date: 2/5/15

17134
subject:

```
DM_V_ASTART => DM_V_ASTART,
DM_V_AEND   => DM_V_AEND,
DM_H_ASTART => DM_H_ASTART,
DM_H_AEND   => DM_H_AEND,
LUT_CBUS    => LUT_CBUS,
GC_CBUS     => gc_cbus,
HOST_IBUS   => host_ibus

);
DATA-IN
ata_value <= gc_cbus(7 downto 0);
rwaddr_write <= gc_cbus(8);
gwaddr_write <= gc_cbus(9);
owaddr_write <= gc_cbus(10);
```

(RGB pulse DATA-IN)
(GBWADDR.WRITe GRWADDR.WRITe, GRWADDR.WRITe, DATA-IN)
GRWADDR.WRITe AND WR-PUL

gamma correction processing for r input

gc: gamma_correct
PORT MAP

```
(
  rstn      => rstn,
  PClk      => pclk,
  GC_tbl_write => grwaddr_write,
  GC_value   => data_value,
  GC_use     => GC_use,
  Data_in    => rgb_in(23 downto 16),
  GC_tbl_out => r_gc_out,
  GC_tbl_in  => r_gc_in,
  GC_tbl_addr => r_gc_addr,
  GC_tbl_ceb => r_gc_ceb,
  GC_tbl_web => r_gc_web,
  GC_tbl_clk => r_gc_clk,
  Data_out   => rgb_out(29 downto 20)
);
```

7/15/13

```
inl      => r_gc_in,
clk      => r_gc_clk,
cen      => r_gc_ceb,
oen      => softzero,
wen      => r_gc_web,
a        => r_gc_addr,
tis      => tis,
tms      => tms,
rgoen    => softzero,
serial_in => TD_LUT(0),
outl     => r_gc_out,
serial_out => TQ_LUT(0)
);
```

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Name	Date
Name	Date

Signature: 2/12/13

Date: 2/15/13

Subject: _____

--
-- gamma correction processing for g input
--

```

_g_gc: gamma_correct
PORT MAP
(
    rstn      => rstn,
    PClk      => pclk,
    GC_tbl_write=> ggwaddr_write,
    GC_value   => data_value,
    GC_use     => GC_use,
    Data_in    => rgb_in(15 downto 8),
    GC_tbl_out => g_gc_out,
    GC_tbl_in  => g_gc_in,
    GC_tbl_addr=> g_gc_addr,
    GC_tbl_ceb => g_gc_ceb,
    GC_tbl_web => g_gc_web,
    GC_tbl_clk => g_gc_clk,
    Data_out   => rgb_out(19 downto 10)
);

```

```

_g_gc_tbl: sram_256x10
PORT MAP
(
    in1      => g_gc_in,
    clk      => g_gc_clk,
    cen      => g_gc_ceb,
    oen      => softzero,
    wen      => g_gc_web,
    a        => g_gc_addr,
    tis      => tis,
    tms      => tms,
    tqoen    => softzero,
    serial_in=> TD_LUT(1),
    out1     => g_gc_out,
    serial_out=> TQ_LUT(1)
);

```

-- gamma correction processing for b input

```

rstn      => rstn,
PClk      => pclk,
GC_tbl_write=> gbwaddr_write,
GC_value   => data_value,
GC_use     => GC_use,

```

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_____ Name	_____ Date	Signature: <u>blair</u>
_____ Name	_____ Date	Date: <u>2001/8/15</u>

17126

Subject:

```
Data_in      => rgb_in(7 downto 0),
GC_tbl_out   => b_gc_out,
GC_tbl_in    => b_gc_in,
GC_tbl_addr  => b_gc_addr,
GC_tbl_ceb   => b_gc_ceb,
GC_tbl_web   => b_gc_web,
GC_tbl_clk   => b_gc_clk,
Data_out     => rgb_out(9 downto 0)
);
```

b_gc_tbl: sram_256x10

PORT MAP

```
(
  in1      => b_gc_in,
  clk      => b_gc_clk,
  cen      => b_gc_ceb,
  oen      => softzero,
  wen      => b_gc_web,
  a        => b_gc_addr,
  tis      => tis,
  tms      => tms,
  tqoen    => softzero,
  serial_in => TD_LUT(2),
  out1     => b_gc_out,
  serial_out => TQ_LUT(2)
);
```

group delay compensation

-i_delay_comp: delay_comp

PORT MAP

```
(
  pclk      => pclk,
  phs       => phs,
  ph_active => ph_active,
  pde       => pde,
  pvs       => pvs,
  pv_active => pv_active,
  pvde      => pvde,
  phs_out   => phs_out,
  ph_active_out => ph_active_out,
  pde_out   => pde_out,
  pvs_out   => pvs_out,
  pv_active_out => pv_active_out,
  pvde_out  => pvde_out
);
```

TO BEHAVIORAL;

Disclosed To And Understood By Me

Name	Date
Name	Date

Signature:

Date:

blair
2/2/15
2/2/15

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000592

Subject: _____

File: D:\projects\ttfcII\escalade_db\proj_xuracII\CODEGEN\gamma_correct_2.vhd
 2000/3/9, 05:16:14PM

```
-- Copyright (c) 1994-1999 Escalade Corporation. All rights reserved.
-- Block proj_xuracII/gamma_correct:BEHAVIORAL
-- 7 inputs
-- 6 outputs
-- 0 inouts
--
-- RTL code generated by DesignBook LAM
--
-- Title:          proj_xuracII/gamma_correct:BEHAVIORAL
-- Author:         albert
-- Date:          12/21/99 19:43
-- Description:
--
--
-- library IEEE;
-- use IEEE.std_logic_1164.all;
-- use IEEE.std_logic_arith.all;
-- library tcfc_pkgs_lib;
-- use tcfc_pkgs_lib.constant_pkg.all;
-- use tcfc_pkgs_lib.reg_table_pkg.all;
--
-- pragma translate_off
-- library MATRIX_Lib;
-- library IIC_Lib;
-- library FSC_Lib;
-- library tsmc_macro_025_lib;
-- library auto_check_lib;
-- library tsmc_io_025_lib;
-- library tcfc_gate_lib;
-- use tcfc_gate_lib.all;
-- pragma translate_on
--
-- escalade endheader
--
-----
-- gama_corret : gamma correction
--
-- designer      : Albert Wang
--
-- description    : A lookup table is used for gamma_correction that includes
--                  1. gamma_correct lookup table initialization via I2C
--                  2. panel data is processed via lookup table for gamma_correct
--                  3. bypass gamma_correction
--                  Group delay = 3 pclk for gamma_correction
--
-- Date          : Aug 02 1998   first creation
--
-- Version       : 2.0
--
-- History       : extend gamma table from 8 bit to 10 bit, need two write cycle
--                  to collect 10 bit data from I2C
--
-----
--
-- library IEEE;
-- use IEEE.std_logic_1164.all;
-- use IEEE.std_logic_unsigned.all;
-- -- escalade ports -begin
-- entity gamma_correct is
--   port (rstn : in      std_logic;
--         pclk : in      std_logic;
--         GC_tbl_write : in      std_logic;
--         GC_value : in      std_logic_vector(7 downto 0);
--         GC_use : in      std_logic;
--         Data_in : in      std_logic_vector(7 downto 0);
--         GC_tbl_out : in      std_logic_vector(9 downto 0);
--         GC_tbl_in : out     std_logic_vector(9 downto 0);
--         GC_tbl_addr : out    std_logic_vector(7 downto 0);
--         GC_tbl_csb : out     std_logic;
--         GC_tbl_wsb : out     std_logic;
--         GC_tbl_clk : out     std_logic;
--         Data_out : out      std_logic_vector(9 downto 0));
-- end gamma_correct;
-- -- escalade ports -end
--
-- ARCHITECTURE BEHAVIORAL OF gamma_correct IS
--
-- component CountUp8
--   port
--   (
--     Clk      : in      std_logic;
--     Reset    : in      std_logic;
--     Enable   : in      std_logic;
--     Count    : out     std_logic_vector(8 downto 0)
--   );
-- end component;
--
-- SIGNAL data_in_01 : std_logic_vector(7 downto 0);
-- SIGNAL data_in_02 : std_logic_vector(7 downto 0);
```

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17138
Subject: _____

File: D:\projects\ttscII\escalade_db\proj_zuracII\@CODEGEN\gamma_correct_2.vhd
2000/3/9, 05:16:14PM

```
SIGNAL cnt_rst      : std_logic;
SIGNAL GC_tbl_write_D1 : std_logic;
SIGNAL GC_tbl_write_D2 : std_logic;
SIGNAL GC_tbl_addr_wr_i : std_logic_vector(8 downto 0);
SIGNAL GC_tbl_addr_wr : std_logic_vector(7 downto 0);
SIGNAL GC_tbl_addr_rd : std_logic_vector(7 downto 0);
SIGNAL lreg         : std_logic_vector(7 downto 0);
SIGNAL GC_tbl_ceb_wr : std_logic;
SIGNAL GC_tbl_ceb_rd : std_logic;
SIGNAL GC_tbl_web_wr : std_logic;
SIGNAL GC_tbl_web_rd : std_logic;
SIGNAL mode_sel      : std_logic;
SIGNAL web_win       : std_logic;

BEGIN

-----
-- Gamma_correct table initialisation
-----

cnt_rst <= NOT rstn;

-- gamma_correct table writing address generation
-- after GC_value is written into lookup table
-- address is increased by delay of GC_tbl_write
l_addr_cnt: CountDAS5
PORT MAP
(
    Clk    => PClk,
    Reset  => cnt_rst,
    Enable  => GC_tbl_write_D2,
    Count  => GC_tbl_addr_wr_i
);

-- actual GC table address increase by two write pulse
GC_tbl_addr_wr <= GC_tbl_addr_wr_i(8 downto 1);

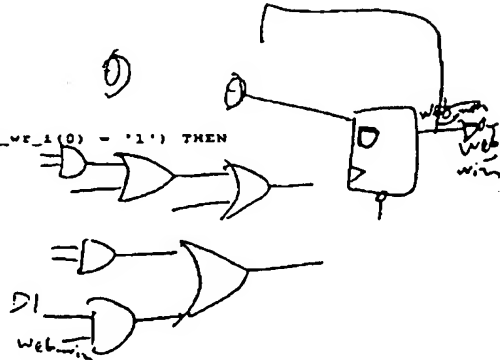
-- latch low nibble when GC_tbl_addr_wr_i(0) is low
PROCESS(PClk)
BEGIN
    IF (PClk'event AND PClk = '1') THEN
        IF (rstn = '0') THEN
            lreg <= (others => '0');
        ELSE
            IF (GC_tbl_addr_wr_i(0) = '0' AND GC_tbl_write = '1') THEN
                lreg <= GC_value;
            END IF;
        END IF;
    END IF;
END PROCESS;

-- ramweb for write
PROCESS(PClk)
BEGIN
    IF (PClk'event AND PClk = '1') THEN
        IF (rstn = '0') THEN
            web_win <= '1';
        ELSEIF (GC_tbl_write = '1' AND GC_tbl_addr_wr_i(0) = '1') THEN
            web_win <= '0';
        ELSEIF (GC_tbl_write_D1 = '0') THEN
            web_win <= '1';
        ELSE
            web_win <= web_win;
        END IF;
    END IF;
END PROCESS;

GC_tbl_web_wr <= web_win;

PROCESS(PClk)
BEGIN
    IF (PClk'event AND PClk = '1') THEN
        GC_tbl_write_D1 <= GC_tbl_write;
        GC_tbl_write_D2 <= GC_tbl_write_D1;
        IF (GC_tbl_addr_wr_i(0) = '1') THEN
            GC_tbl_in <= GC_value(0 DOWNTO 3) & lreg;
        END IF;
    END IF;
END PROCESS;

-- ramceb for write
PROCESS(PClk)
BEGIN
    IF (PClk'event AND PClk = '0') THEN
        IF (GC_tbl_addr_wr_i(0) = '1') THEN
            GC_tbl_ceb_wr <= (NOT GC_tbl_write_D1);
        ELSE
            GC_tbl_ceb_wr <= '1';
        END IF;
    END IF;
END PROCESS;
```



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TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000594

Subject: _____

17139

File: D:\projects\trumpion\escalade_db\proj_zurad11\@CODEGEN\gamma_correct_2.vhd
2000/3/9, 05:16:14PM

```
END IF;
END PROCESS;

-----
-- Gamma_correct manipulation part
-----

-- delay part
PROCESS(PClk)
BEGIN
  IF (PClk'event AND PClk = '1') THEN
    data_in_D1 <= data_in;
    data_in_D2 <= data_in_D1;
  END IF;
END PROCESS;

-- map graphic input data into GC_tbl address
GC_tbl_addr_rd <= data_in_D1;

-- according to GC_use assign GC ramceb for read
PROCESS(GC_use, PClk)
BEGIN
  IF (GC_use = '1') THEN
    GC_tbl_ceb_rd <= PClk;
    GC_tbl_web_rd <= '1';
  ELSE
    GC_tbl_ceb_rd <= '1';
    GC_tbl_web_rd <= '1';
  END IF;
END PROCESS;

-----
-- Gamma_correct output selection
-----

-- generate ramceb, ramweb and ram address for read/write
mode_sel <= NOT web_win;

PROCESS(mode_sel, GC_tbl_addr_rd, GC_tbl_addr_wr)
BEGIN
  IF (mode_sel = '1') THEN
    GC_tbl_addr <= GC_tbl_addr_wr;
  ELSE
    GC_tbl_addr <= GC_tbl_addr_rd;
  END IF;
END PROCESS;

PROCESS(mode_sel, GC_tbl_ceb_rd, GC_tbl_ceb_wr)
BEGIN
  IF (mode_sel = '1') THEN
    GC_tbl_ceb <= GC_tbl_ceb_wr;
  ELSE
    GC_tbl_ceb <= GC_tbl_ceb_rd;
  END IF;
END PROCESS;

PROCESS(mode_sel, GC_tbl_web_rd, GC_tbl_web_wr)
BEGIN
  IF (mode_sel = '1') THEN
    GC_tbl_web <= GC_tbl_web_wr;
  ELSE
    GC_tbl_web <= GC_tbl_web_rd;
  END IF;
END PROCESS;

-- assign data_out that is from GC_tbl or direct input
PROCESS(PClk)
BEGIN
  IF (PClk'event AND PClk = '1') THEN
    IF (GC_use = '1') THEN
      Data_out <= GC_tbl_out;
    ELSE
      Data_out <= data_in_D2 & '0' & '0';
    END IF;
  END IF;
END PROCESS;

GC_tbl_clk <= PClk;
END BEHAVIORAL;
```

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TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000595

17170

Subject: _____

File: D:\projects\ctcf\escalade_db\proj_surac\CODEGEN\CountURE9.vhd 2000/1/31, 08:28:06PM

```

-- designer      : Albert Wang
-- description    : 9 Bits Up Counter, synchronous Reset, Enable input
-- history       : Aug 03 1998  first creation

```

```

-- escalade ports -begin
entity CountURE9 is
  port (Clk : in      std_logic;
        Reset : in    std_logic;
        Enable : in    std_logic;
        Count : out   std_logic_vector(8 downto 0));
end CountURE9;
-- escalade ports -end

```

```

architecture veril of CountURE9 is
  signal c      : std_logic_vector(8 downto 0);
  signal cyLo   : std_logic;

```

```
begin
```

```

  cto_process : process(Clk)
  begin
    if (Clk'event AND CLK = '1') then
      if Reset = '1' then
        c(3 downto 0) <= "0000";
      else
        if Enable = '1' then
          c(0) <= not c(0);
          if c(0) = '1' then
            c(1) <= not c(1);
            if c(1) = '1' then
              c(2) <= not c(2);
              if c(2) = '1' then
                c(3) <= not c(3);
              end if;
            end if;
          end if;
        end if;
      end if;
    end process;

```

```

  cylo_process : process(Clk)
  begin
    if (Clk'event AND CLK = '1') then
      if Reset = '1' then
        cyLo <= '0';
      else
        case c(3 downto 0) is
          when "1111" => cyLo <= not Enable;
          when "1110" => cyLo <= Enable;
          when others => cyLo <= '0';
        end case;
      end if;
    end process;

```

```

  ch1_process : process(Clk)
  begin
    if (Clk'event AND CLK = '1') then
      if Reset = '1' then
        c(8 downto 4) <= "00000";
      else
        if ((Enable = '1') and (cyLo = '1')) then
          c(4) <= not c(4);
          if c(4) = '1' then
            c(5) <= not c(5);
            if c(5) = '1' then
              c(6) <= not c(6);
              if c(6) = '1' then
                c(7) <= not c(7);
                if c(7) = '1' then
                  c(8) <= not c(8);
                end if;
              end if;
            end if;
          end if;
        end if;
      end if;
    end process;
  Count <= c;
end veril;

```

delay 1 clk . . . it is 1110

two counter 较 1 counter
J.

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Date: 2/5/16

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000596

Subject: hostif_gc.vhdl study

File: D:\projects\ttfc\Ivescalade_db\proj_zuracil\sim_TCP_V1\blk\sim3\hostif_gc.vhd 2000/3/9, 05:16:14PM

```
-- Author: gshwang
library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.std_logic_arith.all;
library ttfc_pkgs_lib;
use ttfc_pkgs_lib.constant_pkg.all;
use ttfc_pkgs_lib.reg_table_pkg.all;

library IIC_Lib;
library F8C_Lib;
library tsmc_macro_025_lib;
library auto_check_lib;
library tsmc_io_025_lib;

library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.std_logic_arith.all;
use ttfc_pkgs_lib.constant_pkg.all;
use ttfc_pkgs_lib.reg_table_pkg.all;

entity hostif_gc is
  generic (ADDR_SIZE : integer := 8;
           DATA_SIZE : integer := 8);
  port (CLK : in std_logic;
        RSTN : in std_logic;
        SZERO : in std_logic;
        IIC_DIRM : in std_logic;
        PVS : in std_logic;
        RCAB_CBUS : out std_logic_vector(15 downto 0);
        GCAB_CBUS : out std_logic_vector(15 downto 0);
        BCAB_CBUS : out std_logic_vector(15 downto 0);
        DEDIM_LIGHT : out std_logic_vector(3 downto 0);
        CLUT_ALPHA : out std_logic_vector(3 downto 0);
        DM_V_ASTART : out std_logic_vector(10 downto 0);
        DM_V_AEND : out std_logic_vector(10 downto 0);
        DM_H_ASTART : out std_logic_vector(10 downto 0);
        DM_H_AEND : out std_logic_vector(10 downto 0);
        LUT_CBUS : out std_logic_vector(8 downto 0);
        GC_CBUS : out std_logic_vector(10 downto 0);
        HOST_IBUS : in std_logic_vector(17 downto 0));
end hostif_gc;
-- escalade ports -end
```

Vertical start pulse

← [RGB_pulse & DATA]

→ RD & NR & DATA_IN & ADDR_IN

```
architecture behavioral of hostif_gc is
  -----
  -- component declare --
  -----
  -- for 8 bits or less register
  component DEC_REG_IADDR
  generic (
    ADDR_SIZE : integer := 8; -- address bits size
    DATA_SIZE : integer := 8; -- data transfer bits size
    REGDATA_SIZE : integer := 8; -- reg used bits size
  )
  port (
    CLK : in std_logic;
    RSTN : in std_logic;
    SZERO : in std_logic;
    IIC_DIRM : in std_logic;
    VS_PUL : in std_logic;
    HOST_IBUSN : in std_logic_vector(DATA_SIZE+1 downto 0);
    REG_EN : in std_logic;
    REG_INI : in std_logic_vector(REGDATA_SIZE-1 downto 0);
    REG_VALUE : out std_logic_vector(REGDATA_SIZE-1 downto 0);
    REG_OUT : out std_logic_vector(DATA_SIZE-1 downto 0);
  );
  end component;

  -- for 11 bits register
  component DEC_REG_ZADDRUP
  port (
    CLK : in std_logic;
    RSTN : in std_logic;
    SZERO : in std_logic;
    IIC_DIRM : in std_logic;
    VS_PUL : in std_logic;
    HOST_IBUSN : in std_logic_vector(9 downto 0);
    REGM_EN : in std_logic;
    REGI_EN : in std_logic;
    REG_INI : in std_logic_vector(10 downto 0);
    REG_VALUE : out std_logic_vector(10 downto 0);
    REG_OUT : out std_logic_vector(7 downto 0);
  );
  end component;

  -- CLUT_ALPHA register value 01/11/99
  signal CLUT_ALPHA_DATA : std_logic_vector(7 downto 0); -- reg B6
end architecture;
```

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Date: 2005/5/17

17142.
subject:

File: D:\projects\ctf\c11\escalade_db\proj_zurac11\sim_top_v1\blk\sim3\host12_gc
.und 2000/3/9, 05:16:14PM

```
-- DE_DIM register data 26/10/99
signal DMH_START_DATA : std_logic_vector(10 downto 0); -- reg 49, 4B
signal DMH_END_DATA : std_logic_vector(10 downto 0); -- reg 4B, 4A
signal DMV_START_DATA : std_logic_vector(10 downto 0); -- reg 4D, 4C
signal DMV_END_DATA : std_logic_vector(10 downto 0); -- reg 4F, 4E
signal DE_LIGHT_DATA : std_logic_vector(3 downto 0); -- reg 4F MSB 4-bit
signal DMV_ENDM_DATA : std_logic_vector(7 downto 0); -- reg 4F
signal DMV_ENDL_DATA : std_logic_vector(7 downto 0); -- reg 4E
-- brightness & contrast register
signal RCONTRAST_DATA : std_logic_vector(7 downto 0); -- reg AE, Zurac11
signal RBRIGHTNESS_DATA : std_logic_vector(7 downto 0); -- reg AF
signal GCONTRAST_DATA : std_logic_vector(7 downto 0); -- reg 80, Zurac11
signal GBRIGHTNESS_DATA : std_logic_vector(7 downto 0); -- reg 81
signal BCONTRAST_DATA : std_logic_vector(7 downto 0); -- reg 87, Zurac11
signal BBRIGHTNESS_DATA : std_logic_vector(7 downto 0); -- reg 88
-- CLUT_ALPHA register value 01/11/99
signal CLUT_ALPHA_OUT : std_logic_vector(7 downto 0); -- reg B6
-- DE_DIM register output data 26/10/99
signal DMH_START_OUT : std_logic_vector(7 downto 0); --
signal DMH_END_OUT : std_logic_vector(7 downto 0); --
signal DMV_START_OUT : std_logic_vector(7 downto 0); --
signal DMV_END_OUT : std_logic_vector(7 downto 0); --
-- brightness & contrast register output data
signal RCONTRAST_OUT : std_logic_vector(7 downto 0);
signal RBRIGHTNESS_OUT : std_logic_vector(7 downto 0);
signal GCONTRAST_OUT : std_logic_vector(7 downto 0);
signal GBRIGHTNESS_OUT : std_logic_vector(7 downto 0);
signal BCONTRAST_OUT : std_logic_vector(7 downto 0);
signal BBRIGHTNESS_OUT : std_logic_vector(7 downto 0);
-- CLUT_ALPHA register value 01/11/99
signal CLUT_ALPHA_EN : std_logic;
-- DE_DIM register data 26/10/99
signal DMH_START_EN : std_logic;
signal DMH_ENDL_EN : std_logic;
signal DMH_ENDM_EN : std_logic;
signal DMH_START_EN : std_logic;
signal DMV_START_EN : std_logic;
signal DMV_ENDL_EN : std_logic;
signal DMV_ENDM_EN : std_logic;
-- brightness & contrast register
signal RCONTRAST_EN : std_logic;
signal RBRIGHTNESS_EN : std_logic;
signal GCONTRAST_EN : std_logic;
signal GBRIGHTNESS_EN : std_logic;
signal BCONTRAST_EN : std_logic;
signal BBRIGHTNESS_EN : std_logic;
signal GRWADDR_EN : std_logic;
signal GSWADDR_EN : std_logic;
signal LUTWADDR_EN : std_logic;
signal GRWADDR_WRITE : std_logic;
signal GSWADDR_WRITE : std_logic;
signal LUTWADDR_WRITE : std_logic;
-- initial value table
-- CLUT_ALPHA register value 01/11/99
signal CLUT_ALPHAINI : std_logic_vector(7 downto 0);
-- DE_DIM register initial value 26/10/99
signal DMH_STARTINI : std_logic_vector(10 downto 0);
signal DMH_ENDINI : std_logic_vector(10 downto 0);
signal DMV_STARTINI : std_logic_vector(10 downto 0);
signal DMV_ENDINI : std_logic_vector(7 downto 0);
signal DMV_ENDLINI : std_logic_vector(7 downto 0);
-- Zurac11, initial value 26/10/99
signal RCONTRASTINI : std_logic_vector(7 downto 0);
signal RBRIGHTNESSINI : std_logic_vector(7 downto 0);
signal GCONTRASTINI : std_logic_vector(7 downto 0);
signal GBRIGHTNESSINI : std_logic_vector(7 downto 0);
signal BCONTRASTINI : std_logic_vector(7 downto 0);
signal BBRIGHTNESSINI : std_logic_vector(7 downto 0);
--
signal HOST_ISUSH : std_logic_vector(9 downto 0);
signal ADEP_IN : std_logic_vector(7 downto 0);
signal DATA_IN : std_logic_vector(7 downto 0);
signal WA : std_logic;
signal WR_FUL : std_logic;
signal WR : std_logic;
signal WA_FUL : std_logic;
signal RD : std_logic;
signal VS_D1 : std_logic;
signal VS_D2 : std_logic;
signal VS_FUL : std_logic;
--
begin
-- initial value assignment
```

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TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000598

Subject:

17143

File: D:\projects\ctf\c1\escalade_ub\proj_zurac11\sim_TOP_V1\blk\sim3\host12_00
vhd 2000/3/9, 05:16:14PM

```
RCONTRASTINI <- RCONTRAST_INI;
RBRIGHTNESSINI <- RBRIGHTNESS_INI;
GCONTRASTINI <- GCONTRAST_INI;
GBRIGHTNESSINI <- GBRIGHTNESS_INI;
BCONTRASTINI <- BCONTRAST_INI;
BBRIGHTNESSINI <- BBRIGHTNESS_INI;

-- HOST_OBUS <- CONTRAST_OUT OR BRIGHTNESS_OUT;
-- DE_OIM register value 26/10/99
DMH_STARTINI <- BM_START_INI;
DMH_ENDINI <- BM_END_INI;
DMV_STARTINI <- BV_START_INI;
DMV_ENDINI <- BV_END_INI(7 downto 0);
DMV_ENDHINI <- DE_LIGHT_INI & '0' & BV_END_INI(10 downto 8);
-- CLUT_ALPHA register value 01/11/99
CLUT_ALPHA_INI <- "0000" & CLUT_ALPHA_INI;
-- BUS for DE_OIM
DE_LIGHT_DATA <- DMV_ENDH_DATA(7 downto 4);
DMV_END_DATA <- DMV_ENDH_DATA(2 downto 0) & DMV_ENDL_DATA;
DE_OIM_LIGHT <- DE_LIGHT_DATA;
DM_V_AEND <- DMV_END_DATA;
DM_V_ASTART <- DMV_START_DATA;
DM_M_AEND <- DMH_END_DATA;
DM_M_ASTART <- DMH_START_DATA;

-- CLUT_ALPHA register value 01/11/99
CLUT_ALPHA <- CLUT_ALPHA_DATA(3 downto 0);
-- BUS for contrast and brightness
RCAB_CBUS(7 downto 0) <- RCONTRAST_DATA;
RCAB_CBUS(15 downto 8) <- RBRIGHTNESS_DATA;
GCAB_CBUS(7 downto 0) <- GCONTRAST_DATA;
GCAB_CBUS(15 downto 8) <- GBRIGHTNESS_DATA;
BCAB_CBUS(7 downto 0) <- BCONTRAST_DATA;
BCAB_CBUS(15 downto 8) <- BBRIGHTNESS_DATA;

LUT_CBUS(7 downto 0) <- DATA_IN;
LUT_CBUS(8) <- LUTWADDR_write;
-- BUS for scaling
GC_CBUS(7 downto 0) <- DATA_IN;
GC_CBUS(8) <- GWADDR_write;
GC_CBUS(9) <- GSWADDR_write;
GC_CBUS(10) <- GSWADDR_write;

-- Assign IBUS value
ADDR_IN <- HOST_IBUS(7 downto 0);
DATA_IN <- HOST_IBUS(15 downto 8);
WR <- HOST_IBUS(15);
RD <- HOST_IBUS(17);
```

(R&B) CAB-CBUS

BRIGHTNESS CONTRAST

WRPUL RAND GSWADDR_CN

(6)

(8)

```
p_pul_gen: process (CLK, RSTN)
begin
if (CLK'event and CLK = '1') then
if (RSTN = '0' or RSTN = 'L') then
WR_D1 <- '0';
WR_D2 <- '0';
WR_PUL <- '0';
else
WR_D1 <- WR;
WR_D2 <- WR_D1;
WR_PUL <- WR_D1 and not(WR_D2);
end if;
end if;
end process;

vs_pul_gen: PROCESS(CLK, RSTN)
BEGIN
IF (CLK'event and CLK = '1') THEN
IF (RSTN = '0' or RSTN = 'L') THEN
VS_D1 <- '0';
VS_D2 <- '0';
VS_PUL <- '0';
ELSE
VS_D1 <- PVS;
VS_D2 <- VS_D1;
VS_PUL <- VS_D1 AND NOT(VS_D2);
END IF;
END IF;
END PROCESS;

HOST_IBUSN <- WR_PUL & RD & DATA_IN;

-- CLUT_ALPHA register value 01/11/99 --
I_CLUT_ALPHA : DEC_REG_IADDR -- reg B6
generic map (
ADDR_SIZE => 8, -- address bits size
DATA_SIZE => 8, -- data transfer bits size
```

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Date: 00/1/17

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
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TR000599

17144
subject: DEC-REG-1 ADDR.vhdl code study

File: D:\projects\ttfc\Ivescalade_db\proj_scaler_vhdl\RECODEGEN\DEC_REG_1ADDR.vhd
2000/3/5. 04:46:26PM

```
-- Author: albert
library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.std_logic_arith.all;
library ttfc_pkg_lib;
use ttfc_pkg_lib.constant_pkg.all; -- escalade ports -begin
entity DEC_REG_1ADDR is
  generic (
    ADDR_SIZE : integer := 8;
    DATA_SIZE : integer := 8;
    REGDATA_SIZE : integer := 8
  );
  port (
    CLK : in std_logic;
    RSTN : in std_logic;
    SZERO : in std_logic;
    IIC_DIWR : in std_logic;
    VS_PUL : in std_logic;
    HOST_IBUSN : in std_logic_vector(ADDR_SIZE + 1 downto 0);
    REG_EN : in std_logic;
    REG_INI : in std_logic_vector(REGDATA_SIZE - 1 downto 0);
    REG_VALUE : out std_logic_vector(REGDATA_SIZE - 1 downto 0);
    REG_OUT : out std_logic_vector(DATA_SIZE - 1 downto 0)
  );
end DEC_REG_1ADDR;
-- escalade ports -end

architecture lan of DEC_REG_1ADDR is

  --signal REG_DATA : std_logic_vector(REGDATA_SIZE-1 downto 0);
  signal REG_DATA1 : std_logic_vector(REGDATA_SIZE-1 downto 0);
  signal REG_DATA2 : std_logic_vector(REGDATA_SIZE-1 downto 0);
  signal REG_DATA_TMP : std_logic_vector(DATA_SIZE-1 downto 0);
  signal DATA_ZERO : std_logic_vector(DATA_SIZE-1 downto 0);
  signal DATA_IN : std_logic_vector(7 downto 0);
  signal RD : std_logic;
  signal WR_PUL : std_logic;

begin

  REG_VALUE <= REG_DATA2;
  REG_DATA_TMP <= DATA_ZERO(DATA_SIZE-1 downto REGDATA_SIZE)
    & REG_DATA2 when (DATA_SIZE > REGDATA_SIZE) else REG_DATA2;
  REG_OUT <= REG_DATA_TMP when (RD='1' and REG_EN='1') else DATA_ZERO;

  DATA_ZERO <= (SZERO,SZERO,SZERO,SZERO,SZERO,SZERO,SZERO,SZERO);

  DATA_IN <= HOST_IBUSN(DATA_SIZE-1 downto 0);
  RD <= HOST_IBUSN(DATA_SIZE);
  WR_PUL <= HOST_IBUSN(DATA_SIZE+1);

  -----
  -- level 1 register
  -----
  p_regdata:
  process (CLK, RSTN)
  begin
    if (CLK'event and CLK = '1') then
      if (RSTN = '0' or RSTN = 'L') then
        REG_DATA1 <= REG_INI;
      else
        if (REG_EN = '1' and WR_PUL = '1') then
          REG_DATA1 <= DATA_IN(REGDATA_SIZE-1 downto 0);
        end if;
      end if;
    end if;
  end process;

  -----
  -- level 2 register
  -----
  process (CLK, RSTN)
  begin
    if (CLK'event and CLK = '1') then
      if (RSTN = '0' or RSTN = 'L') then
        REG_DATA2 <= REG_DATA1;
      else
        if (IIC_DIWR='0') then
          if (VS_PUL = '1') then
            REG_DATA2 <= REG_DATA1;
          end if;
        else
          REG_DATA2 <= REG_DATA1;
        end if;
      end if;
    end if;
  end process;
end lan;
```

disclosed To And Understood By Me

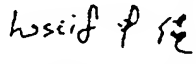
Name	Date
Name	Date

Signature: Elc.Y
Date: 2001/5/17

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000600

॥ श्रीगणेशाय नमः ॥



股子。

二、二、三

~~REF. OUT-0~~

10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846.

$$\Rightarrow \text{REG_OUT} = \text{REG_IN}$$

SIZE - 1 ~ 0

DATA SIZE bits

Signature: blair
Date: June 5/18

17146 hostif_gc sendy
subject:

File: D:\projects\ttcfcli\escalade_db\proj_zuracii\iSIM_TOP_v1\blk\sim3\hostif_gc.vhd 2000/3/9, 05:16:14PM

```
REGDATA_SIZE => 8) -- req used bits size
port map(
    CLK      => CLK ,
    RSTN     => RSTN,
    SZERO    => SZERO,
    IIC_DIRW => IIC_DIRW,
    VS_FUL   => VS_FUL,
    HOST_IBUSN => HOST_IBUSN,
    REG_EN   => CLUT_ALPHA_EN,
    REG_INI  => CLUT_ALPHA_INI,
    REG_VALUE => CLUT_ALPHA_DATA,
    REG_OUT  => CLUT_ALPHA_OUT);
```

0000 "2" 0000
→ CLUT-ALPHA (LSB 4 bits)

```
-- DE_DIM register value 26/10/99
I_DMH_Start :DEC_REG_2ADDRUP -- reg 49.48
port map(
    CLK      => CLK ,
    RSTN     => RSTN,
    SZERO    => SZERO,
    IIC_DIRW => IIC_DIRW,
    VS_FUL   => VS_FUL,
    HOST_IBUSN => HOST_IBUSN,
    REGM_EN  => DMH_STARTM_EN,
    REGL_EN  => DMH_STARTL_EN,
    REG_INI  => DMH_STARTINI,
    REG_VALUE => DMH_START_DATA,
    REG_OUT  => DMH_START_OUT);
```

→ DM-H-ASTART

```
I_DMH_END :DEC_REG_2ADDRUP -- reg 4B.4A
port map(
    CLK      => CLK ,
    RSTN     => RSTN,
    SZERO    => SZERO,
    IIC_DIRW => IIC_DIRW,
    VS_FUL   => VS_FUL,
    HOST_IBUSN => HOST_IBUSN,
    REGM_EN  => DMH_ENDM_EN,
    REGL_EN  => DMH_ENDL_EN,
    REG_INI  => DMH_ENDINI,
    REG_VALUE => DMH_END_DATA,
    REG_OUT  => DMH_END_OUT);
```

→ DM-H-END

```
I_DMV_Start :DEC_REG_2ADDRUP -- reg 4D.4C
port map(
    CLK      => CLK ,
    RSTN     => RSTN,
    SZERO    => SZERO,
    IIC_DIRW => IIC_DIRW,
    VS_FUL   => VS_FUL,
    HOST_IBUSN => HOST_IBUSN,
    REGM_EN  => DMV_STARTM_EN,
    REGL_EN  => DMV_STARTL_EN,
    REG_INI  => DMV_STARTINI,
    REG_VALUE => DMV_START_DATA,
    REG_OUT  => DMV_START_OUT);
```

→ DM-V-ASTART

```
I_DMVM_END :DEC_REG_1ADDR -- reg 4F
generic map (
    ADDR_SIZE => 8, -- address bits size
    DATA_SIZE => 8, -- data transfer bits size
    REGDATA_SIZE => 8) -- req used bits size
port map(
    CLK      => CLK ,
    RSTN     => RSTN,
    SZERO    => SZERO,
    IIC_DIRW => IIC_DIRW,
    VS_FUL   => VS_FUL,
    HOST_IBUSN => HOST_IBUSN,
    REGM_EN  => DMV_ENDM_EN,
    REGL_EN  => DMV_ENDL_EN,
    REG_INI  => DMV_ENDINI,
    REG_VALUE => DMV_END_DATA,
    REG_OUT  => DMV_END_OUT);
```

→ DM-V-END

```
I_DMV2_END :DEC_REG_1ADDR -- reg 4E
generic map (
    ADDR_SIZE => 8, -- address bits size
    DATA_SIZE => 8, -- data transfer bits size
    REGDATA_SIZE => 8) -- req used bits size
port map(
    CLK      => CLK ,
    RSTN     => RSTN,
    SZERO    => SZERO,
    IIC_DIRW => IIC_DIRW,
    VS_FUL   => VS_FUL,
    HOST_IBUSN => HOST_IBUSN,
    REGM_EN  => DMV2_ENDM_EN,
    REGL_EN  => DMV2_ENDL_EN,
    REG_INI  => DMV2_ENDINI,
    REG_VALUE => DMV2_END_DATA,
```

→ DM-V2-END

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| | | |
|------|------|-------------------|
| Name | Date | Signature: 0/9/14 |
| Name | Date | Date: 2000/5/18 |

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000602

Subject: DEC-REG_2ADDRUP ude sandy

17147

File: D:\projects\trfscil\escalade_db\proj_scaler_vhdl\@CODEGEN\DEC_REG_2ADDRUP.v
nd 2000/3/5, 04:46:26PM

```
-- Author:          coeng
library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.std_logic_arith.all; -- escalate ports -begin
entity DEC_REG_2ADDRUP is
    port (
        CLK :          in  std_logic;
        RSTN :         in  std_logic;
        SZERO :        in  std_logic;
        IIC_DIWR :     in  std_logic;
        VS_PUL :       in  std_logic_vector(9 downto 0);
        HOST_IBUSN :   in  std_logic_vector(9 downto 0);
        REGM_EN :      in  std_logic;
        REGL_EN :      in  std_logic;
        REG_IN1 :      in  std_logic_vector(10 downto 0);
        REG_VALUE :    out std_logic_vector(10 downto 0);
        REG_OUT :      out std_logic_vector(7 downto 0);
    );
end DEC_REG_2ADDRUP;
-- escalate ports -end

architecture lan of DEC_REG_2ADDRUP is

    signal REG_DATA1 : std_logic_vector(10 downto 0);
    signal REG_DATA2 : std_logic_vector(10 downto 0);
    signal ADDR_IN :  std_logic_vector(7 downto 0);
    signal DATA_IN : std_logic_vector(7 downto 0);
    signal DATA_ZERO : std_logic_vector(7 downto 0);
    signal REG_OUT_TMP : std_logic_vector(7 downto 0);
    signal WR_PUL : std_logic;
    signal RD : std_logic;

begin

    REG_VALUE <= REG_DATA2;
    REG_OUT <= REG_DATA2(7 downto 0) when (RD='1' and REGM_EN='1') else
        REG_OUT_TMP when (RD='1' and REGL_EN='1')
    else DATA_ZERO;

    DATA_ZERO <= (SZERO,SZERO,SZERO,SZERO,SZERO,SZERO,SZERO,SZERO);
    REG_OUT_TMP <= DATA_ZERO(4 downto 0) & REG_DATA2(10 downto 8);

    DATA_IN <= HOST_IBUSN(7 downto 0);
    RD <= HOST_IBUSN(8);
    WR_PUL <= HOST_IBUSN(9);

    -----
    -- level 1
    -----
    p_regdata:
    process (CLK, RSTN)
    begin
        if (CLK'event and CLK = '1') then
            if (RSTN = '0' or RSTN = 'L') then
                REG_DATA1 <= REG_IN1;
            else
                if (REGL_EN = '1' and WR_PUL = '1') then
                    REG_DATA1(7 downto 0) <= DATA_IN;
                end if;
                if (REGM_EN = '1' and WR_PUL = '1') then
                    REG_DATA1(10 downto 8) <= DATA_IN(2 downto 0);
                end if;
            end if;
        end if;
    end process;

    -----
    -- level 2
    -----
    process (CLK, RSTN)
    begin
        if (CLK'event and CLK = '1') then
            if (RSTN = '0' or RSTN = 'L') then
                REG_DATA2 <= REG_IN1;
            else
                if (IIC_DIWR='0') then
                    if (VS_PUL = '1') then
                        REG_DATA2 <= REG_DATA1;
                    end if;
                else
                    REG_DATA2 <= REG_DATA1;
                end if;
            end if;
        end if;
    end process;

end lan;
```

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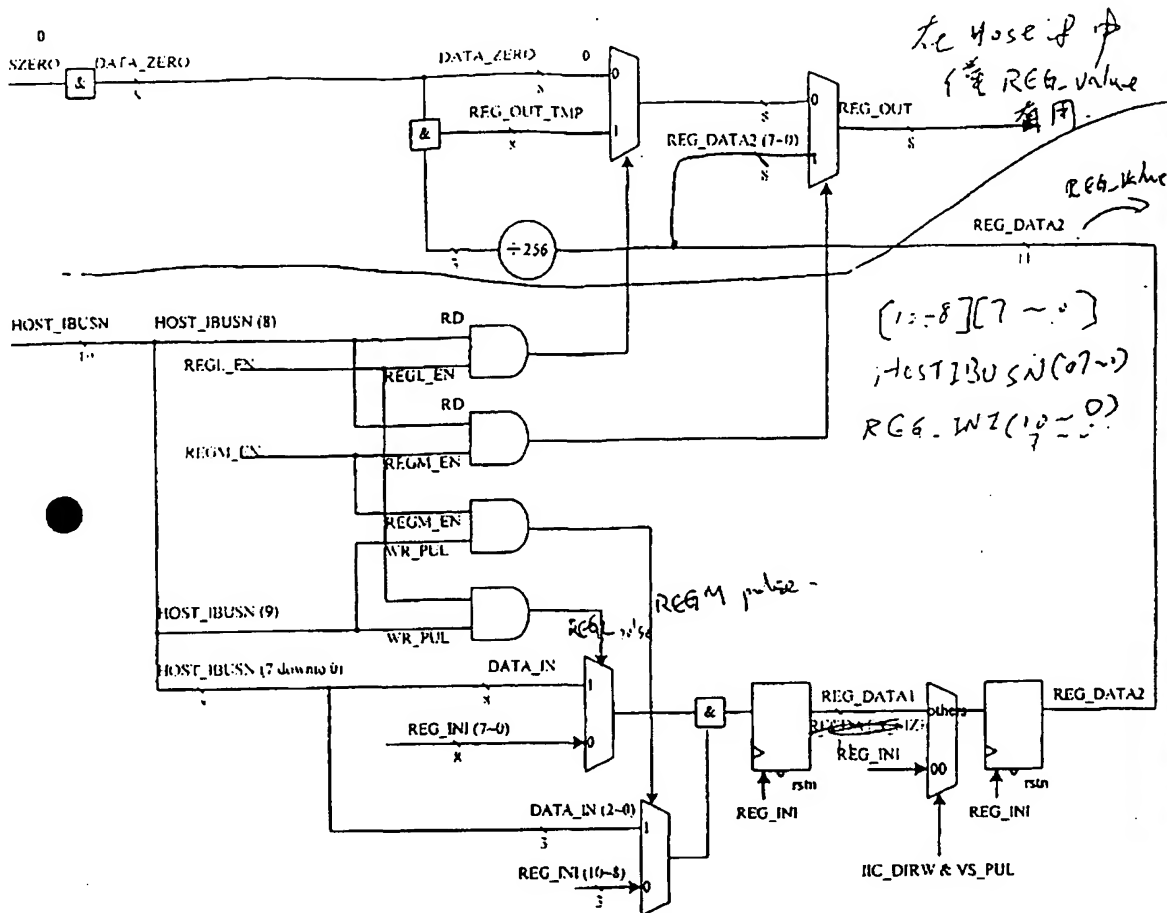
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| Name | Date |
| Name | Date |

Signature: blair
Date: 200/5/12

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000603

Subject: 17148 DEC-REG-2 ADDRUP flow chart



if HOSTIBUSN(18)=0 or REGLEN=REGM.EN=0 \Rightarrow REG_OUT=0

if rsen or IIC_DIRW & VS_PUL=00 or
WR_PUL=0 or REGM.EN=REGI.EN=0 \Rightarrow REG_OUT=0

~~REGM.EN=WR_PUL=REGI.EN=1~~

if RD & REGM.EN=1 \Rightarrow REG_OUT=REG_DATA1 (17~0)

else if RD & REGI.EN=1 \Rightarrow REG_OUT=REG_DATA2

else

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Name _____ Date _____

Signature: b15iv

Date: 2020/5/18

Subject: _____

1. $\overline{WR_PUL} = 0 \Rightarrow REG_DATA2 = REG_IN1$ $RSEN = 1$ $\overline{IX_DIRW} = 0 \text{ AND } \overline{VS_PUL} = 0$ $REGM_EN = REG1_EN = 0$ 2. if $WR_PUL = 1$ ① $REGM = REG1 = 1 \Rightarrow REG_DATA1 = DATA_IN(2-0, 7-0)$ ② $REGM = 1, REG1 = 0 \Rightarrow REG_DATA1 = DATA_IN(2-0) \& REG1(7-0)$ ③ $REGM = 0, REG1 = 1 \Rightarrow REG_DATA1 = REG_IN1(1-0) \& DATA_IN(7-0)$ 3. if $RD = 1$ ① $REGM = REG1 = 1 \Rightarrow REG_OUT = REG_DATA2(7-0)$
 $DATA_IN(7-0)$ ② $REGM = 1, REG1 = 0 \Rightarrow REG_OUT = REG_DATA2(7-0)$
 $DATA_IN(7-0)$ ③ $REGM = 0, REG1 = 1 \Rightarrow REG_OUT = REG_IN1(1-0) \& DATA_IN(7-0)$
 $DATA_IN(7-0)$

M: MSB

L: LSB

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Name

Date

Signature: blairDate: 11/19/19

Name

Date

17150

Subject:

File: D:\projects\trc\esc\escalade_db\proj_zurac\zSIM_TOP_VI\hik\sim3\hostif_gc.vhd 2000/3/9, 05:16:14PM

```

REG_OUT  => DMV_END_OUT ;

-----
-- brightness & contrast register
-----
IR_CONTRAST : DEC_REG_IADDR
generic map (
  ADDR_SIZE => 8, -- address bits size
  DATA_SIZE => 8, -- data transfer bits size
  REGDATA_SIZE => 8) -- reg used bits size
port map (
  CLK      => CLK ,
  RSTN     => RSTN,
  SZERO    => SZERO,
  IIC_DIRW => IIC_DIRW,
  VS_PUL   => VS_PUL,
  HOST_IBUSN => HOST_IBUSN,
  REG_EN   => RCONTRAST_EN,
  REG_INI  => RCONTRAST_INI,
  REG_VALUE => RCONTRAST_DATA,
  REG_OUT  => RCONTRAST_OUT
);

```

R-CONTRAST

```

IR_BRIGHTNESS : DEC_REG_IADDR
generic map (
  ADDR_SIZE => 8, -- address bits size
  DATA_SIZE => 8, -- data transfer bits size
  REGDATA_SIZE => 8) -- reg used bits size
port map (
  CLK      => CLK ,
  RSTN     => RSTN,
  SZERO    => SZERO,
  IIC_DIRW => IIC_DIRW,
  VS_PUL   => VS_PUL,
  HOST_IBUSN => HOST_IBUSN,
  REG_EN   => RBRIGHTNESS_EN,
  REG_INI  => RBRIGHTNESS_INI,
  REG_VALUE => RBRIGHTNESS_DATA,
  REG_OUT  => RBRIGHTNESS_OUT
);

```

R-BRIGHTNESS

```

IG_CONTRAST : DEC_REG_IADDR
generic map (
  ADDR_SIZE => 8, -- address bits size
  DATA_SIZE => 8, -- data transfer bits size
  REGDATA_SIZE => 8) -- reg used bits size
port map (
  CLK      => CLK ,
  RSTN     => RSTN,
  SZERO    => SZERO,
  IIC_DIRW => IIC_DIRW,
  VS_PUL   => VS_PUL,
  HOST_IBUSN => HOST_IBUSN,
  REG_EN   => GCONTRAST_EN,
  REG_INI  => GCONTRAST_INI,
  REG_VALUE => GCONTRAST_DATA,
  REG_OUT  => GCONTRAST_OUT
);

```

G-CONTRAST

```

IG_BRIGHTNESS : DEC_REG_IADDR
generic map (
  ADDR_SIZE => 8, -- address bits size
  DATA_SIZE => 8, -- data transfer bits size
  REGDATA_SIZE => 8) -- reg used bits size
port map (
  CLK      => CLK ,
  RSTN     => RSTN,
  SZERO    => SZERO,
  IIC_DIRW => IIC_DIRW,
  VS_PUL   => VS_PUL,
  HOST_IBUSN => HOST_IBUSN,
  REG_EN   => GBRIGHTNESS_EN,
  REG_INI  => GBRIGHTNESS_INI,
  REG_VALUE => GBRIGHTNESS_DATA,
  REG_OUT  => GBRIGHTNESS_OUT
);

```

G-BRIGHTNESS

```

IB_CONTRAST : DEC_REG_IADDR
generic map (
  ADDR_SIZE => 8, -- address bits size
  DATA_SIZE => 8, -- data transfer bits size
  REGDATA_SIZE => 8) -- reg used bits size
port map (
  CLK      => CLK ,
  RSTN     => RSTN,
  SZERO    => SZERO,
  IIC_DIRW => IIC_DIRW,
  VS_PUL   => VS_PUL,
  HOST_IBUSN => HOST_IBUSN,
  REG_EN   => BCONTRAST_EN,
  REG_INI  => BCONTRAST_INI,
  REG_VALUE => BCONTRAST_DATA,
  REG_OUT  => BCONTRAST_OUT
);

```

B-CONTRAST

```

IB_BRIGHTNESS : DEC_REG_IADDR

```

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| Name | Date |
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TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
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TR000606

Subject:

File: D:\projects\vtc\GII\escalade_db\proj_zuracii\ISM_TOP_V1\blk\sim3\host1r_00
.vhd 2000/3/9, 03:16:14PM

```
generic map (
    ADDR_SIZE => 8, -- address bits size
    DATA_SIZE => 8, -- data transfer bits size
    REGDATA_SIZE => 8) -- reg used bits size
port map (
    CLK => CLK,
    RSTN => RSTN,
    SZERO => SZERO,
    IIC_DIOW => IIC_DIOW,
    VS_PUL => VS_PUL,
    MOST_IBUSN => MOST_IBUSN,
    REG_EN => BBRIGHTNESS_EN,
    REG_INI => BBRIGHTNESS_INI,
    REG_VALUE => BBRIGHTNESS_DATA,
    REG_OUT => BBRIGHTNESS_OUT);
```

B-BRIGHTNESS

```
GWADDR_write <- WR_PUL AND GWADDR_EN;
GGWADDR_write <- WR_PUL AND GGWADDR_EN;
GBWADDR_write <- WR_PUL AND GBWADDR_EN;
LUTWADDR_write <- WR_PUL AND LUTWADDR_EN;
```

```
-- Address decoder
adec: PROCESS(ADDR_IN)
BEGIN
    -- Contrast register
    RCONTRAST_EN <= '0'; -- reg AE
    RBRIGHTNESS_EN <= '0'; -- reg AF
    GCONTRAST_EN <= '0'; -- reg B0
    GBRIGHTNESS_EN <= '0'; -- reg B1
    BCONTRAST_EN <= '0'; -- reg B7
    BBRIGHTNESS_EN <= '0'; -- reg B8
    GRWADDR_EN <= '0'; -- reg B2
    GGWADDR_EN <= '0'; -- reg B3
    GBWADDR_EN <= '0'; -- reg B4
    LUTWADDR_EN <= '0'; -- reg B5

    -- DE DIM register
    DMH_STARTL_EN <= '0';
    DMH_STARTH_EN <= '0';
    DMH_ENDL_EN <= '0';
    DMH_ENDH_EN <= '0';
    DMV_STARTL_EN <= '0';
    DMV_STARTH_EN <= '0';
    DMV_ENDL_EN <= '0';
    DMV_ENDH_EN <= '0';

    -- CLUT ALPHA register
    CLUT_ALPHA_EN <= '0';

    CASE ADDR_IN IS
        -- Contrast and brightness register
        WHEN RCONTRAST_ADDR => RCONTRAST_EN <= '1'; -- reg AE
        WHEN RBRIGHTNESS_ADDR => RBRIGHTNESS_EN <= '1'; -- reg AF
        WHEN GCONTRAST_ADDR => GCONTRAST_EN <= '1'; -- reg B0
        WHEN GBRIGHTNESS_ADDR => GBRIGHTNESS_EN <= '1'; -- reg B1
        WHEN BCONTRAST_ADDR => BCONTRAST_EN <= '1'; -- reg B7
        WHEN BBRIGHTNESS_ADDR => BBRIGHTNESS_EN <= '1'; -- reg B8
        WHEN GRWADDR_ADDR => GRWADDR_EN <= '1'; -- reg B2
        WHEN GGWADDR_ADDR => GGWADDR_EN <= '1'; -- reg B3
        WHEN GBWADDR_ADDR => GBWADDR_EN <= '1'; -- reg B4
        WHEN LUTWADDR_ADDR => LUTWADDR_EN <= '1'; -- reg B5

        -- DE DIM register
        WHEN DMH_STARTL_ADDR => DMH_STARTL_EN <= '1';
        WHEN DMH_STARTH_ADDR => DMH_STARTH_EN <= '1';
        WHEN DMH_ENDL_ADDR => DMH_ENDL_EN <= '1';
        WHEN DMH_ENDH_ADDR => DMH_ENDH_EN <= '1';
        WHEN DMV_STARTL_ADDR => DMV_STARTL_EN <= '1';
        WHEN DMV_STARTH_ADDR => DMV_STARTH_EN <= '1';
        WHEN DMV_ENDL_ADDR => DMV_ENDL_EN <= '1';
        WHEN DMV_ENDH_ADDR => DMV_ENDH_EN <= '1';

        -- CLUT ALPHA register
        WHEN CLUT_ALPHA_ADDR => CLUT_ALPHA_EN <= '1';

        WHEN OTHERS => NULL;
    END CASE;
END PROCESS adec;

end behavioral;
```

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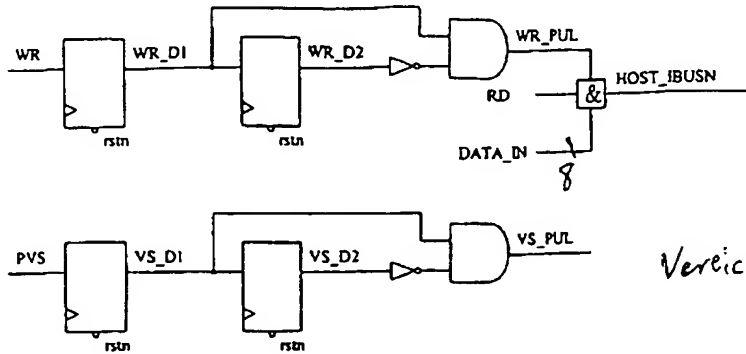
Signature: Blair
Date: 2000/5/19

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
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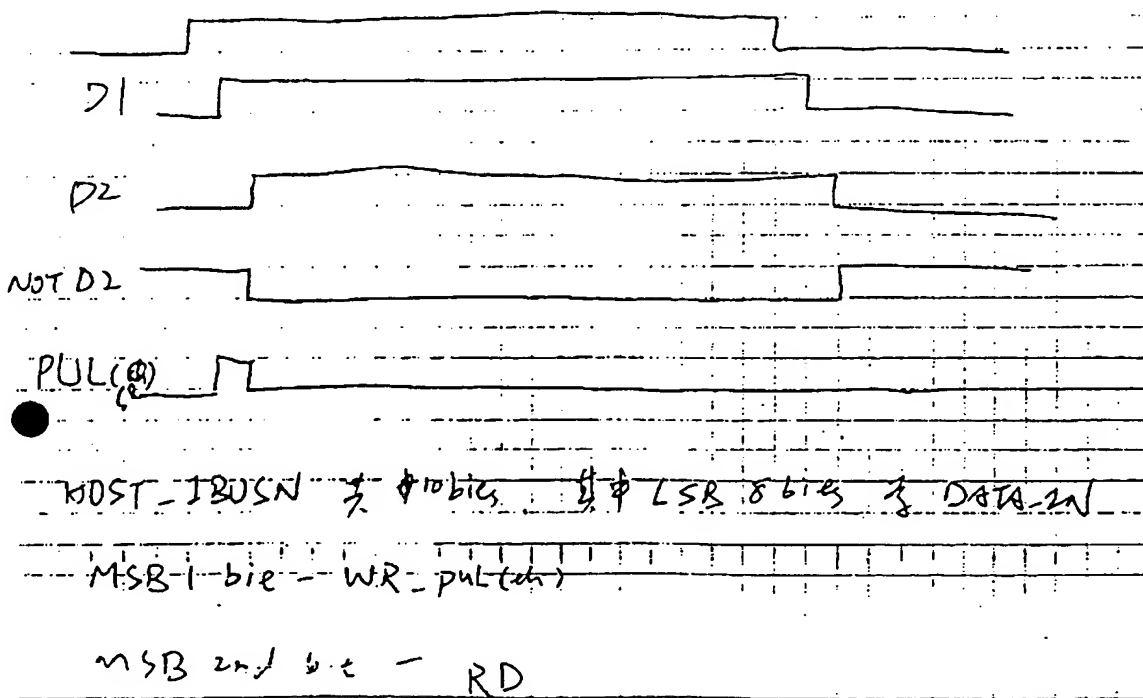
TR000607

17152

Subject: _____



Vertical store pulse



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| Name | Date |

Signature: oleir
 Date: 2001/1/19

[illegible]

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| Name | Date |
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| Name | Date |

Signature: o.k.i.v
Date: 2001/1/20

Date: 22/1/24

17156

Subject: LRAM 2/6 + 10

File: D:\projects\ttfcii\escalade_db\proj_xuracii\@COD2GEN\srsm_256x10.vhd 2000
 /1/31, 08:28:06PM

```
-- Copyright (c) 1994-1999 Escalade Corporation. All rights reserved.
-- Block proj_xuracii/srsm_256x10:behavioral
-- 10 inputs
-- 2 outputs
-- 0 inouts
--
-- RTL code generated by DesignBook LAN
--
-- Title:      proj_xuracii/srsm_256x10:behavioral
-- Author:     albert
-- Date:       12/21/99 19:43
-- Description:
--
--
-- library IEEE;
-- use IEEE.std_logic_1164.all;
-- use IEEE.std_logic_arith.all;
-- library ttfc_pkgs_lib;
-- use ttfc_pkgs_lib.constant_pkg.all;
-- use ttfc_pkgs_lib.req_table_pkg.all;
--
-- pragma translate_off;
-- library MATRIX_Lib;
-- library TIC_Lib;
-- library FBC_Lib;
-- library tsmc_macro_025_lib;
-- library tsmc_025_lib;
-- library tsmc_025_gate_lib;
-- use tsmc_025_gate_lib;
-- pragma translate_on;
--
-- escalade_ports -begin
--
-- File      : srsm_256x10.vhd1
-- Author(s) : Albert Wang
-- Description: test circuit into Artisan srsm.
--              twen is the serial input, tq(7) is the serial output
--              chain order is
--              twen -> tceen -> ta(7) -> ta(6) -> .... -> ta(0) ->
--              td(7) -> td(6) -> ... -> td(1)
--              here, asq(1) connect to ta(1-1)
--              asq(0) connect to td(0)
--              q(1) connect to td(1+1)
--
-- Date      : Oct. 22 1999
-- Version   : 2.0
-- History   :
--
-- library IEEE;
-- use IEEE.std_logic_1164.all;
-- use IEEE.std_logic_unsigned.all;
-- pragma translate_off;
-- library tsmc_macro_025_lib;
-- pragma translate_on;
--
-- escalade_ports -begin
-- entity srsm_256x10 is
--   port (in1 : in std_logic_vector(9 downto 0);
--         clk : in std_logic;
--         cen : in std_logic;
--         oen : in std_logic;
--         wen : in std_logic;
--         a : in std_logic_vector(7 downto 0);
--         tis : in std_logic;
--         tms : in std_logic;
--         tqoen : in std_logic;
--         serial_in : in std_logic;
--         out1 : out std_logic_vector(9 downto 0);
--         serial_out : out std_logic;
--   );
-- end srsm_256x10;
-- escalade_ports -end
--
-- architecture behavioral of srsm_256x10 is
--
-- component srsm256x10
--   port (Q : out std_logic_vector(9 downto 0);
--         CENSQ : out std_logic;
--         CENSO : out std_logic;
--         WENSO : out std_logic;
--         ASQ : out std_logic_vector(7 downto 0);
--         TQ : out std_logic_vector(9 downto 0);
--   );
-- end component;
```

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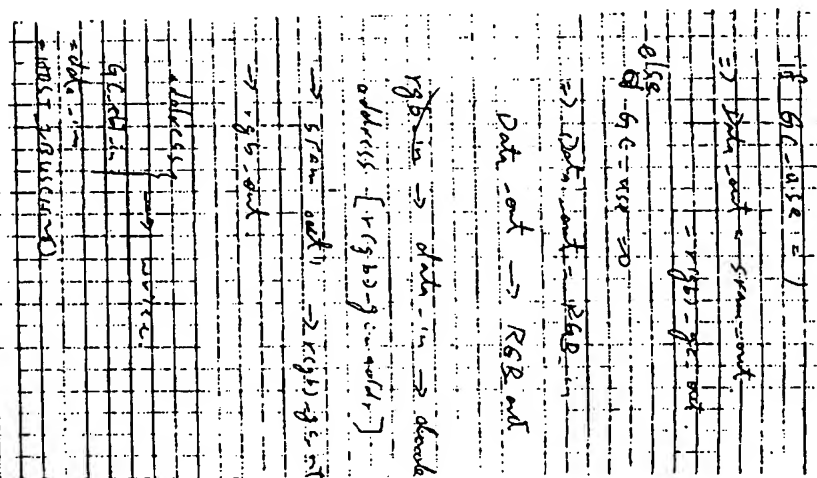
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Signature: blw
 Date: 2/1/00

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
 SUBJECT TO PROTECTIVE ORDER

TR000610

17155



Signature: 6/9/14
Date: 2007/5/20

Subject: _____

17157

File: D:\projects\vtc\c11\escalade_db\proj_sufac11\@CODEGEN\ram_236x10.vhd 2000
/1/31, 08:28:06PM

```
CLK : in      std_logic;
CEN : in      std_logic;
OEN : in      std_logic;
WEN : in      std_logic;
A : in      std_logic_vector(7 downto 0);
D : in      std_logic_vector(9 downto 0);
TIS : in      std_logic;
TMS : in      std_logic;
TCEN : in     std_logic;
TOEN : in     std_logic;
TQOEN : in    std_logic;
TWEN : in     std_logic;
TA : in      std_logic_vector(7 downto 0);
TD : in      std_logic_vector(9 downto 0);

end component;

signal tq      : std_logic_vector(9 downto 0);
signal q       : std_logic_vector(9 downto 0);
signal ta      : std_logic_vector(7 downto 0);
signal td      : std_logic_vector(9 downto 0);
signal asq     : std_logic_vector(7 downto 0);
signal twen    : std_logic;
signal tcen    : std_logic;
signal toen    : std_logic;
signal wensq   : std_logic;
signal censq   : std_logic;
signal oensq   : std_logic;

begin

    twen <= serial_in;
    toen <= wensq;
    tcen <= oensq;
    ta(7) <= censq;
    ta(6 downto 0) <= asq(7 downto 1);
    td(0) <= asq(0);
    td(9 downto 1) <= tq(8 downto 0);
    serial_out <= tq(9);

i_236x10: ram236x10
    port map
    (
        Q          => q,          -- internal use
        CENSQ      => censq,      -- internal use
        OENSQ      => oensq,      -- internal use
        WENSQ      => wensq,      -- internal use
        ASQ        => asq,        -- internal use
        TQ         => tq,         -- internal use
        CLK        => clk,        -- from external
        CEN        => cen,        -- from external
        OEN        => oen,        -- from external
        WEN        => wen,        -- from external
        A          => a,          -- from external
        D          => dnl,        -- from external
        TIS        => tis,        -- from external
        TMS        => tms,        -- from external
        TCEN       => tcen,       -- internal use
        TOEN       => toen,       -- internal use
        TQOEN      => tqoen,      -- from external
        TWEN       => twen,       -- internal use
        TA         => ta,         -- internal use
        TD         => td,         -- internal use
    );

    out1 <= q;
end behavioral;
```

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Signature: bls/r

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Date: 2001/5/20TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000612

Subject: Levenshtein Algorithm

old $\dots -176 > \text{threshold}$

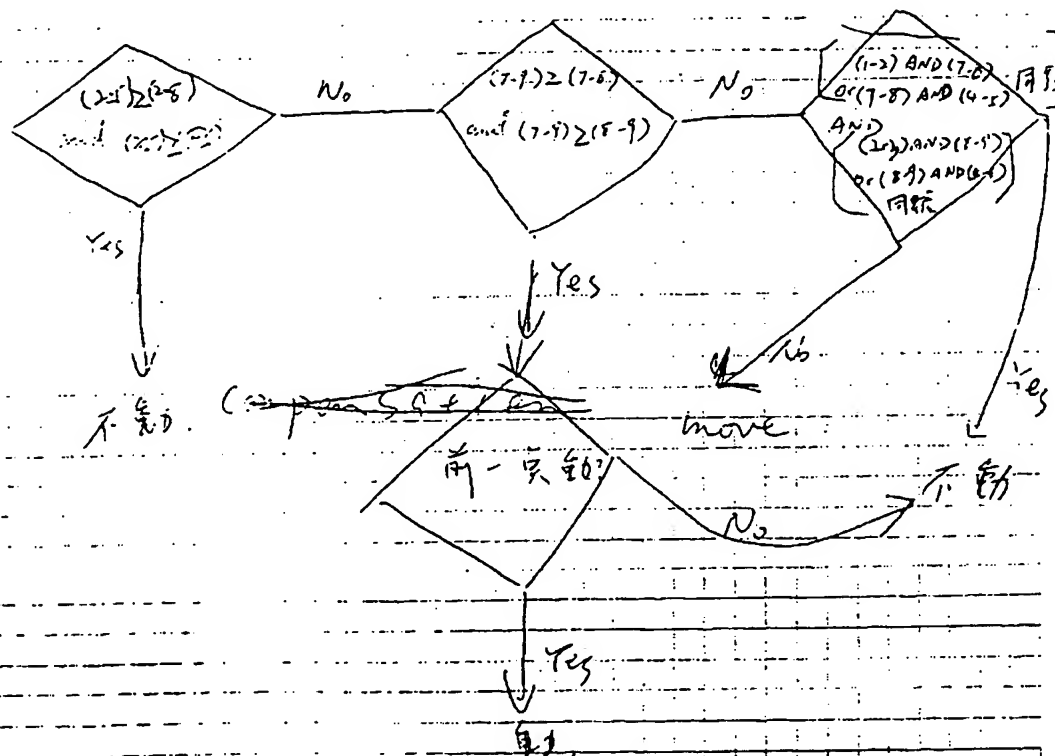
∴ $2E_2 > \text{threshold old}$

1. $24 > 4 \times 5$ 10!

⇒ "Kohlhaas"

$$\Rightarrow \frac{126}{2}, \frac{295}{2}, \frac{171}{2}$$

New thoughts :



285 186 380 例 7.1.2 李慶合數週全
以 composition 之方式可求價值較前 circuit
for $(2, 3) \times (2, 8)$ and $(5, 5) \times (8, 5)$
可以求 $(6, 9)$ and $(6, 5)$ 之值相同

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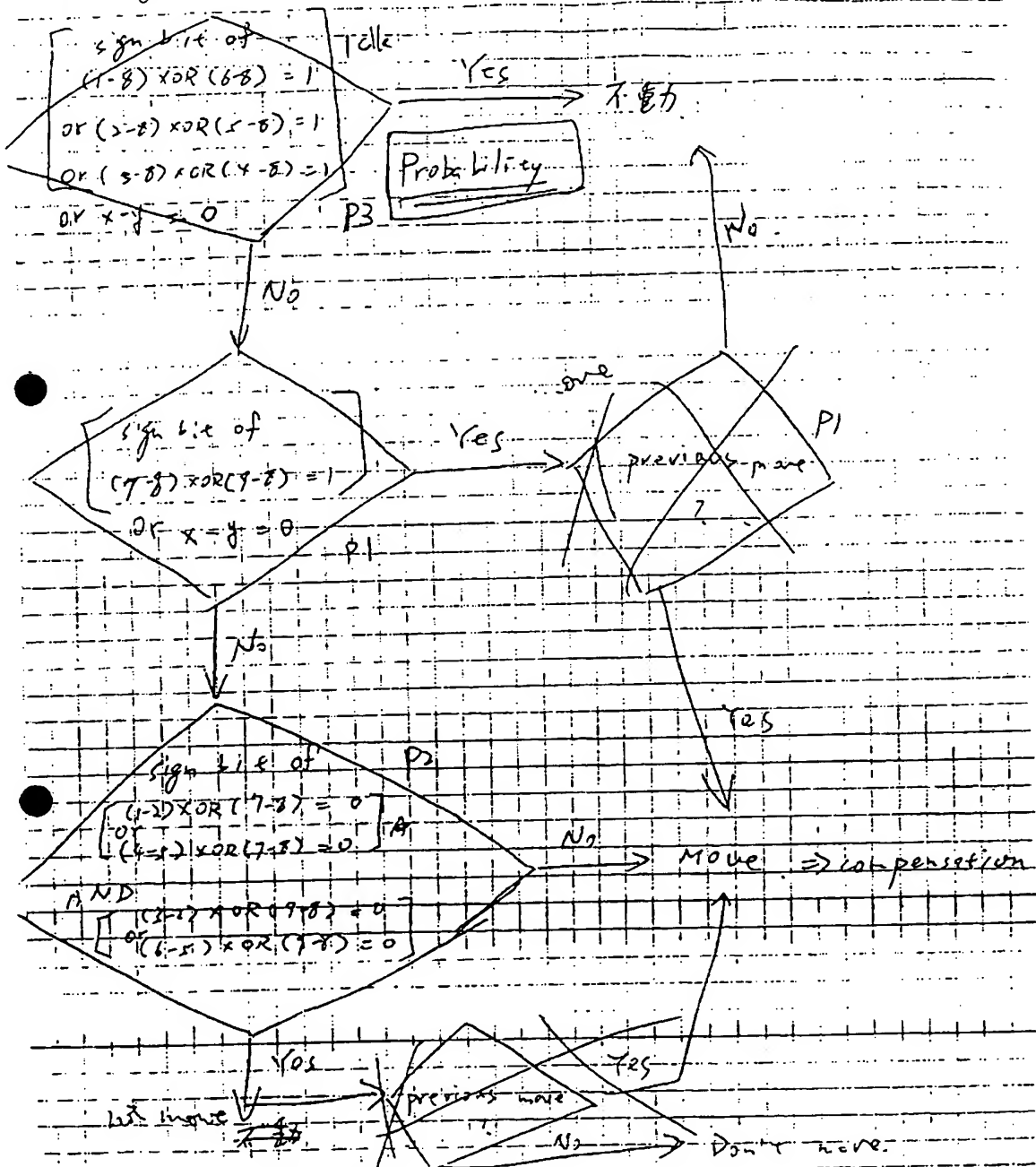
200/1/31

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000613

Subject: _____

New Algorithm



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| Name _____ | Date _____ |

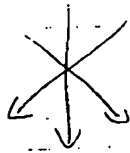
Signature: blair

Date: 200/5/31

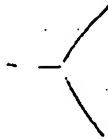
17160

Subject: _____

1 2 3
7 8 9
4 5 6



圖像可由四角、三角、圓形等構成



if $7 \geq 8 \geq 9 \Rightarrow 7 \geq 5 \geq 9$ 成立等不成立
或 $7 \geq 2 \geq 9$

if $7 \leq 8 \leq 9 \Rightarrow 7 \leq 5 \leq 9$ 不成立
or $7 \leq 2 \leq 9$

if $7 > 8 < 9$

_____ < threshold

\Rightarrow 有誤差 \Rightarrow no more

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Name _____ Date _____

Signature: b k. r
Date: 2016/1

TRUMPION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000615

Subject: oslo deinterlace

檔案: C:\projects\scajer\oslo\deinterlace\source code\VHDL\01\deintp2.vhdl 2000
 /6/21, 01:26:57PM

```

LIBRARY ieee;
USE ieee.std_logic_1164.all;
--USE ieee.std_logic_unsigned.all;

-- Gene Chuang, Mar 30, 2000, trumpion use
-- name: deintp2.vhdl (deinterlacing circuit for video)

-- Modified:
-- Jun 14 2000 = 1 => disable
-- "disable" (bypass the deint) signal is added,
-- THDMotion changed from 8-bit to 11-bit
-- Jun 17 2000
-- Modify to an even/odd structure (tandem) for
-- OSLO. Another 3 in and 3 out buses are added.

-- For even and odd ports
-- input: Abuf_data (n-2 Frame t)      output: LA_out (n-2 Frame t)
--       Bbuf_data (n-1 Frame t-1)    LB_out (n-1 Frame t)
--       Cbuf_data (n Frame t)        LC_out (n Frame t)

-- The deinterlacing ckt generates the 3 lines (n-2, n-1, n) for scaler
-- There are 3x3 pixels for motion detection and 1 to Progressive
-- conversion,
-- namely,
-- p1 = RGB(pA.delay1); p2 = RGB(pA.delay2); p3 = RGB(pA.delay3);
-- p4 = RGB(pB.delay1); p5 = RGB(pB.delay2); p6 = RGB(pB.delay3);
-- p7 = RGB(pC.delay1); p8 = RGB(pC.delay2); p9 = RGB(pC.delay3);

-- (Diff81-Diff86 && Diff82-Diff85 && Diff83-Diff84 > THDMotion) means
-- Motion
-- In these cases -
-- Motion: if (Diff82+Diff85 < Diff81-Diff86 && Diff82+Diff85 <
-- Diff83+Diff84)
-- then the result is the averaged of pixel2 and 5.
-- (in the case diff86 is the smallest, the result is the
-- average of pixel 1 and pixel 6)
-- Stationary: the result is from the previous field (F t-1).
-- (in a sense, stationary is the same as deint disabled)
-- Since PH_active (or swap_hs), powerdown, and PV_active are not used, to
-- save
-- power, the input is set to zero during display disable period.
--
-- -----e These 3 col are for even port deinterlacing
-- 1/4 2/5 3/6
-- ep1 op1 ep2 op2 ep3 op3
-- ep7 op7 ep8 op8 ep9 op9
-- ep4 op4 ep5 op5 ep6 op6
-- 1/4 2/5 3/6
-- -----o These 3 col are for odd port
-- 0-----o

entity deintp2 is
  port (
    rstn : in std_logic;
    clk : in std_logic;
    abuf_data : in std_logic_vector(23 downto 0);
    bbuf_data : in std_logic_vector(23 downto 0);
    cbuf_data : in std_logic_vector(23 downto 0);
    disable : in std_logic;
    THDMotion : in std_logic_vector(10 downto 0);
    eLA_out : out std_logic_vector(23 downto 0);
    eLB_out : out std_logic_vector(23 downto 0);
    eLC_out : out std_logic_vector(23 downto 0);
    oLA_out : out std_logic_vector(23 downto 0);
    oLB_out : out std_logic_vector(23 downto 0);
    oLC_out : out std_logic_vector(23 downto 0);
  );
end deintp2;

architecture behavioral of deintp2 is
  component add9
  port
  (
    in1 : in std_logic_vector(8 downto 0);
    in2 : in std_logic_vector(8 downto 0);
    clk : in std_logic;
    sum : out std_logic_vector(8 downto 0);
  );
end component;

```

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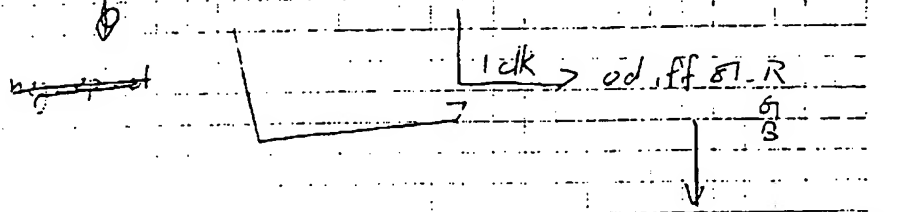
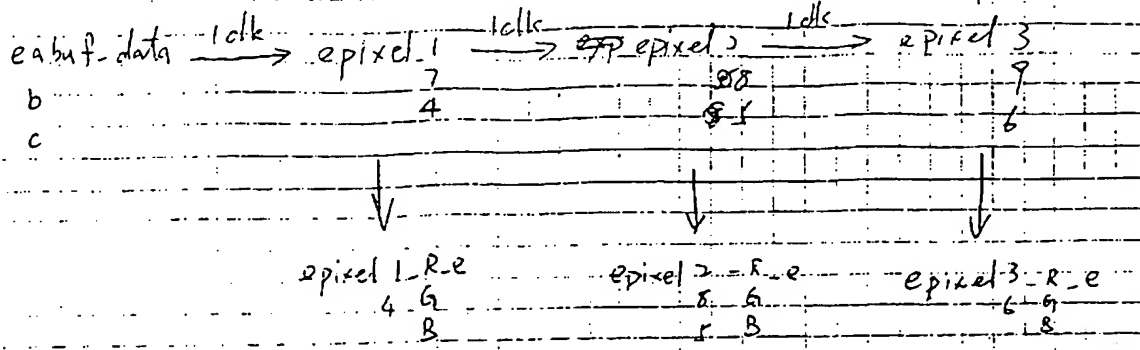
Date: 2000/5/21

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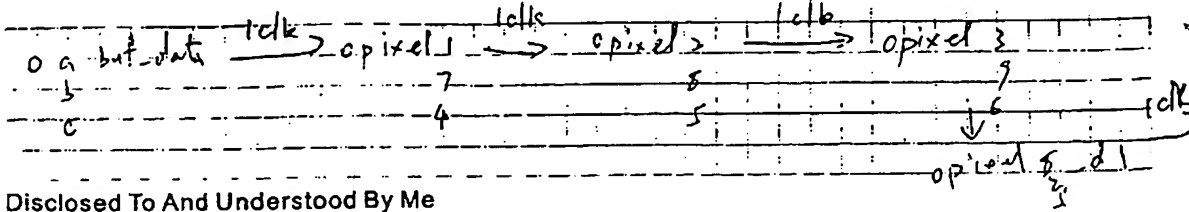
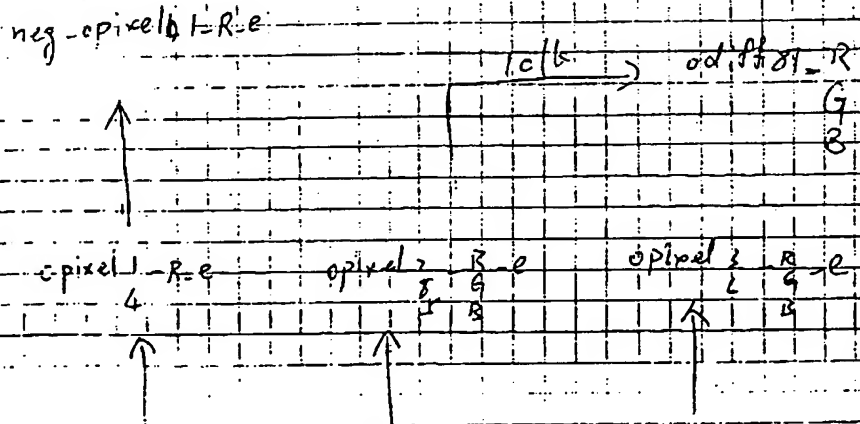
TR000616

Subject: 17102 leinep2 debug

epixel 8-d1 1clk



od, ff 81-R 1clk



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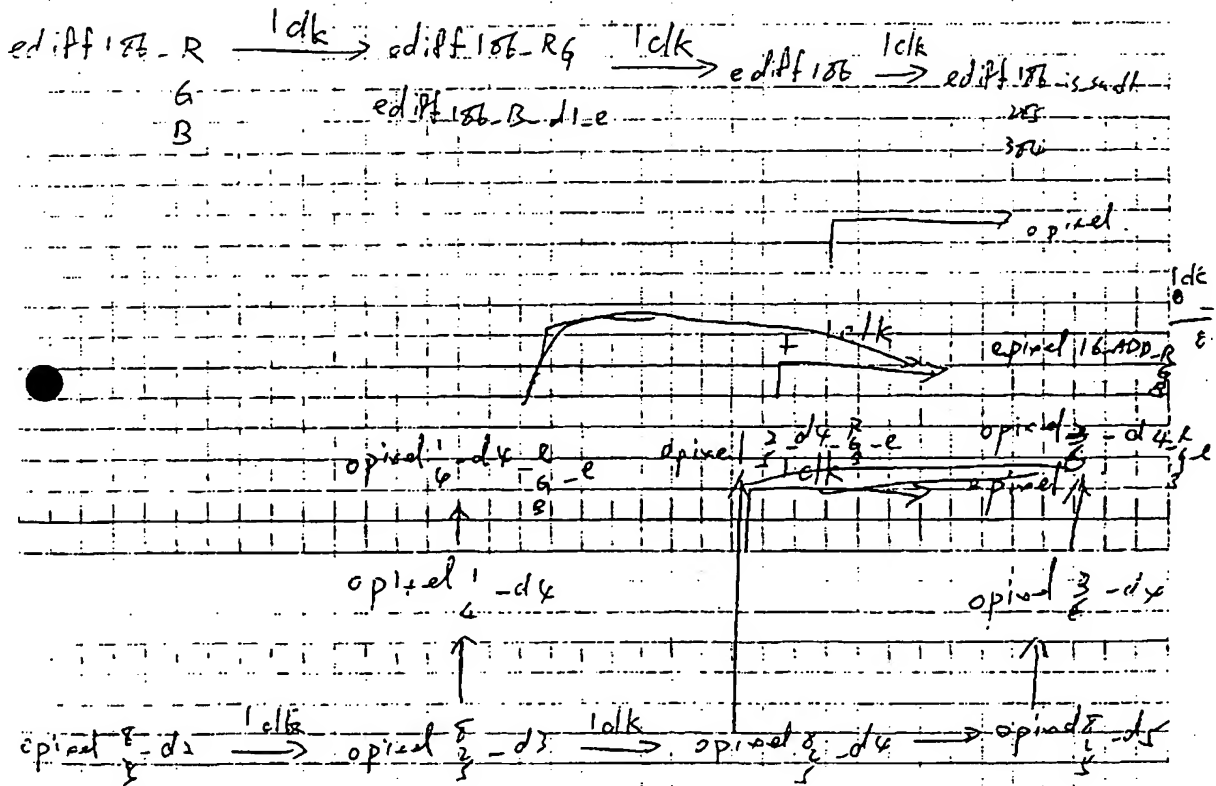
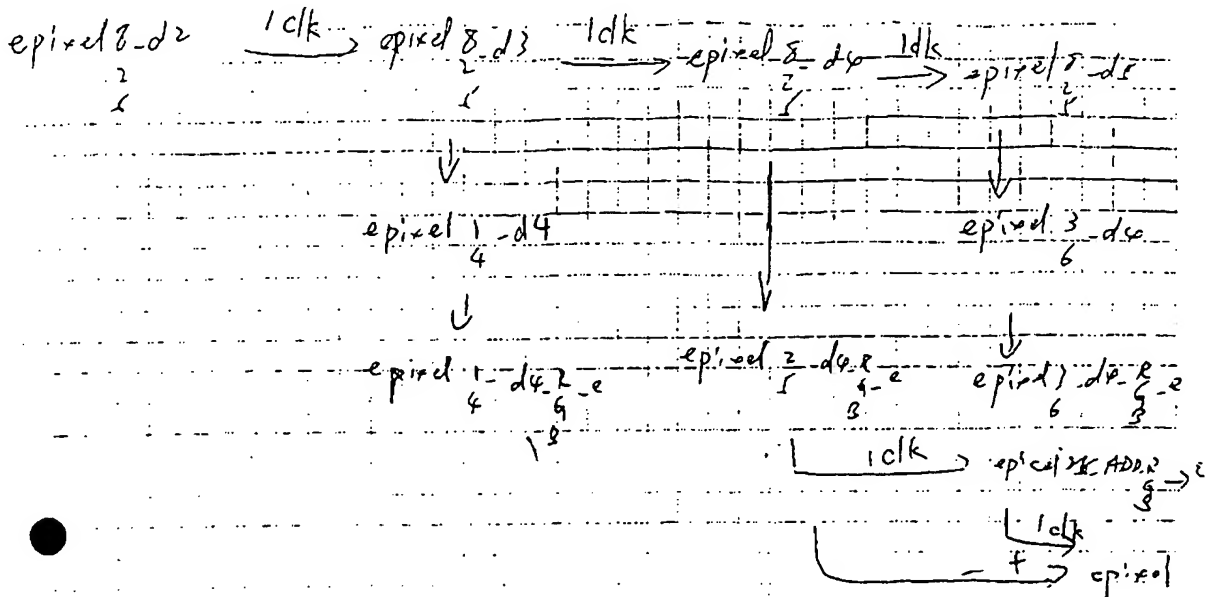
Name _____ Date _____

Signature: blir

Date: 2007/6/23

Subject: _____

17163



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Name _____ Date _____

Signature: Blair

Date: 2003/6/23

17164
Subject: _____

first clk $\rightarrow a0 \rightarrow ep1$

$a0 \rightarrow op1$

$b0 \rightarrow ep7$

$b0 \rightarrow op7$

$c0 \rightarrow ep4$

$c0 \rightarrow op4$

second clk $\rightarrow a2 \rightarrow ep1$

$a3 \rightarrow op1$

$b2 \rightarrow ep7$

$b3 \rightarrow op7$

$c2 \rightarrow ep4$

$c3 \rightarrow op4$

$a0 \rightarrow ep2$

$a1 \rightarrow op2$

$b0 \rightarrow ep8$

$b1 \rightarrow op8$

$c0 \rightarrow ep4$

$c1 \rightarrow op5$

\Rightarrow even: $op1 \quad ep2 \quad op3 \quad \overline{a3} \quad \overline{a0} \quad \overline{a1}$
 $ep8 \quad op8 = \quad b0 \quad b1$
 $op4 \quad ep5 \quad op5 \quad c3 \quad c0 \quad c1$

odd: $ep2 \quad op2 \quad ep3 \quad \overline{a0} \quad \overline{a1} \quad x$
 $ep8 \quad op8 = \quad b0 \quad b1$
 $ep5 \quad op5 \quad op6 \quad c0 \quad c1 \quad x$

\Rightarrow even wrong

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Date: 2/16/27

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TR000619

Subject: _____

ehird clk =>

 $a_4 \rightarrow ep1$ $a_2 \rightarrow ep2$ $a_0 \rightarrow ep3$ $a_5 \rightarrow op1$ $a_3 \rightarrow op2$ $a_1 \rightarrow op1$ $b_4 \rightarrow ep7$ $b_2 \rightarrow ep8$ $b_0 \rightarrow ep9$ $b_5 \rightarrow op7$ $b_3 \rightarrow op8$ $b_1 \rightarrow op9$ $c_4 \rightarrow ep4$ $c_2 \rightarrow ep5$ $c_0 \rightarrow ep6$ $c_5 \rightarrow op4$ $c_3 \rightarrow op5$ $c_1 \rightarrow op6$

=> even: $op1 \quad ep2 \quad op2 \quad a_5 \quad a_2 \quad a_3$
 $op7 \quad ep8 \quad op8 \quad b_5 \quad b_2 \quad b_3$
 $op4 \quad ep5 \quad op5 \quad c_5 \quad c_2 \quad c_3$

odd: $op2 \quad op2 \quad ep3 \quad a_2 \quad a_3 \quad a_0$
 $ep8 \quad op8 \quad ep9 \quad b_2 \quad b_3 \quad b_0$
 $op5 \quad op5 \quad ep6 \quad c_2 \quad c_3 \quad c_0$

=> $\frac{1}{2}$ even odd 共 23 bit, 其中 11 个 1 个 0

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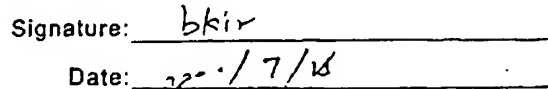
Signature: 3161r

Name

Date

Date: 2000/6/27

study



Subject: cesc vec study (SVGA to XGA)

17167

Input parameter

10 11 00 0
1098 76543210 IH_ASTART - 0d814 = 216 D → Hor Sync Time + H Back Pnci

12 20 0
1098 76543210 IH_AWIDTH - 320 H = 800 D → Hor Addr Time

14 20 0
1098 76543210 IH_TOTAL - 420 H = 1056 D → Hor Total Time

16 03 0
1098 76543210 IV_ASTART - 05 H = 5 D → ~~Hor Sync Time + H Back Pnci~~

18 58 0
1098 76543210 IV_AWIDTH - 256 H = 600 D → Ver Addr Time

18 02 0
1098 76543210 IV_TOTAL - 274 H = 628 D → ~~IV TOTAL~~
Ver Total Time

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Signature: 3/9/11
Date: 2000/7/28

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
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TR000622

Subject:

```
-- output window parameter
```

```
-- background window parameter
```

```

42 28 0
-- PBV_OFFSET_EVEN

```

51 00 0
50 00 0

```
-- PBV_OFFSET_ODD
```

53 00 0
52 00 0

-- PBV WIDTH

35 03 0
34 00 2

```

-----
-- scaling parameter

```

— 2000 —

-- PH EMU
61 03 0

60 39 0

IM ENU
3 02 0

62 11 0

66 02 0

-- Hdy
67 01 0

-- Rhine

68 0C 0
-- Vdx

69 02 0

-- Vdy
6A 01 0

-- VINE
10 10 10

-- АНХА

60 29 3
- - 25 27

6D 06 3

-- AMHINC
6E 04 0

-- Vnum
65 20 0

-- Vdeno

70 19 0

```
-- begin of test vector
```

--@vec

Date: 2000/7/28

Subject: _____

VESA Monitor Timing Specifications Version 1.0 Rev 0.8

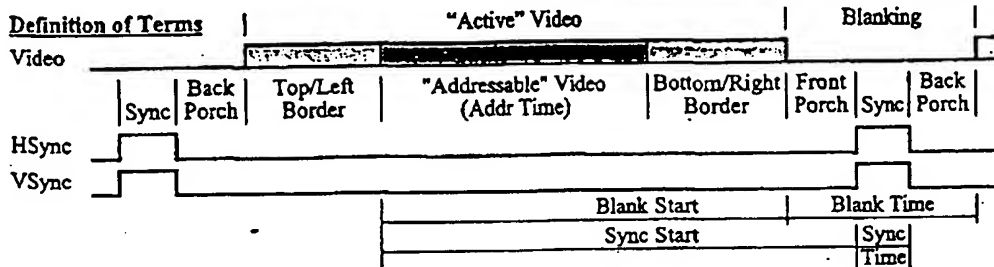
VESA MONITOR TIMING STANDARD

Adopted: 8/7/90 (VESA #900602)
 Resolution: 800 x 600 at 60 Hz (non-interlaced)
 EDID ID: 045h, 040h
 BIOS Modes: 102h, 103h, 113h, 114h, & 115h (4, 8, 15, 16, & 24 bpp)

Video Display Information Format (VDIF)

PreAdjusted Timing Data

| | | | | |
|--------------------|-------------------------------------|-----------|---------------------------|---------------------------|
| Timing Name | = 800 x 600 @ 60Hz; | | | |
| Hor Pixels | = 800; | // Pixels | | |
| Ver Pixels | = 600; | // Lines | | |
| Hor Frequency | = 37.879; | // KHz | = 26.4 usec / line | |
| Ver Frequency | = 60.317; | // Hz | = 16.6 msec / frame | |
| Pixel Clock | = 40.000; | // MHz | = 25.0 nsec ± 0.5% | |
| Character Width | = 8; | // Pixels | = 200.0 nsec | |
| Scan Type | = NONINTERLACED; // H Phase = 2.3 % | | | |
| Hor Sync Polarity | = POSITIVE; | // HBlank | = 24.2% of HTotal | |
| Ver Sync Polarity | = POSITIVE; | // VBlank | = 4.5% of VTTotal | |
| Hor Total Time | = 26.400; | // (usec) | = 132 chars = 1056 Pixels | → IH-TOTAL |
| Hor Addr Time | = 20.000; | // (usec) | = 100 chars = 800 Pixels | → IH-ADDR |
| Hor Blank Start | = 20.000; | // (usec) | = 100 chars = 800 Pixels | |
| Hor Blank Time | = 6.400; | // (usec) | = 32 chars = 256 Pixels | |
| Hor Sync Start | = 21.000; | // (usec) | = 105 chars = 840 Pixels | |
| // H Right Border | = 0.000; | // (usec) | = 0 chars = 0 Pixels | |
| // H Front Porch | = 1.000; | // (usec) | = 5 chars = 40 Pixels | |
| Hor Sync Time | = 3.200; | // (usec) | = 16 chars = 128 Pixels | → IH-PUCEW |
| // H Back Porch | = 2.200; | // (usec) | = 11 chars = 88 Pixels | → IH-ASTART |
| // H Left Border | = 0.000; | // (usec) | = 0 chars = 0 Pixels | |
| Ver Total Time | = 16.579; | // (msec) | = 628 lines | HT - (1.06xHA) → IV-TOTAL |
| Ver Addr Time | = 15.840; | // (msec) | = 600 lines | = 5.2 → IV-ADDR |
| Ver Blank Start | = 15.840; | // (msec) | = 600 lines | |
| Ver Blank Time | = 0.739; | // (msec) | = 28 lines | |
| Ver Sync Start | = 15.866; | // (msec) | = 601 lines | |
| // V Bottom Border | = 0.000; | // (msec) | = 0 lines | |
| // V Front Porch | = 0.026; | // (msec) | = 1 lines | |
| Ver Sync Time | = 0.106; | // (msec) | = 4 lines | |
| // V Back Porch | = 0.607; | // (msec) | = 23 lines | |
| // V Top Border | = 0.000; | // (msec) | = 0 lines | |



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Signature: 3/9/12

Name _____ Date _____

Date: 2007/7/18

17170
Subject: _____

VESA Monitor Timing Specifications Version 1.0 Rev 0.8

VESA MONITOR TIMING STANDARD

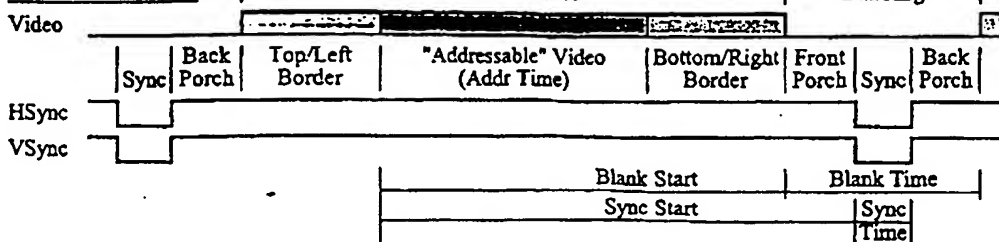
Adopted: 9/10/91 (VESA #901101A)
Resolution: 1024 x 768 at 60 Hz (non-interlaced)
EDID ID: 061h, 040h
BIOS Modes: 104h, 105h, 116h, 117h, & 118h (4, 8, 15, 16, & 24 bpp)

Video Display Information Format (VDIF)

PreAdjusted Timing Data

| | | | |
|--------------------|---|--------------------|--|
| Timing Name | = | 1024 x 768 @ 60Hz; | |
| Hor Pixels | = | 1024; | // Pixels |
| Ver Pixels | = | 768; | // Lines |
| Hor Frequency | = | 48.363; | // KHz = 20.7 usec / line |
| Ver Frequency | = | 60.004; | // Hz = 16.7 msec / frame |
| Pixel Clock | = | 65.000; | // MHz = 15.4 nsec ± 0.5% |
| Character Width | = | 8; | // Pixels = 123.1 nsec |
| Scan Type | = | NONINTERLACED; | // H Phase = 5.1 % |
| Hor Sync Polarity | = | NEGATIVE; | // HBlank = 23.8% of HTotal |
| Ver Sync Polarity | = | NEGATIVE; | // VBlank = 4.7% of VTotal |
| Hor Total Time | = | 20.677; | // (usec) = 168 chars = 1344 Pixels → PH-TOTAL |
| Hor Addr Time | = | 15.754; | // (usec) = 128 chars = 1024 Pixels → PH-ANALY |
| Hor Blank Start | = | 15.754; | // (usec) = 128 chars = 1024 Pixels |
| Hor Blank Time | = | 4.923; | // (usec) = 40 chars = 320 Pixels |
| Hor Sync Start | = | 16.123; | // (usec) = 131 chars = 1048 Pixels |
| // H Right Border | = | 0.000; | // (usec) = 0 chars = 0 Pixels |
| // H Front Porch | = | 0.369; | // (usec) = 3 chars = 24 Pixels |
| Hor Sync Time | = | 2.092; | // (usec) = 17 chars = 136 Pixels → PH-PULW |
| // H Back Porch | = | 2.462; | // (usec) = 20 chars = 160 Pixels → PH-BLANK |
| // H Left Border | = | 0.000; | // (usec) = 0 chars = 0 Pixels |
| Ver Total Time | = | 16.666; | // (msec) = 806 lines HT-(1.06xHA) → PV-TOTAL |
| Ver Addr Time | = | 15.880; | // (msec) = 768 lines = 3.98 → PV-ANALY |
| Ver Blank Start | = | 15.880; | // (msec) = 768 lines |
| Ver Blank Time | = | 0.786; | // (msec) = 38 lines |
| Ver Sync Start | = | 15.942; | // (msec) = 771 lines |
| // V Bottom Border | = | 0.000; | // (msec) = 0 lines |
| // V Front Porch | = | 0.062; | // (msec) = 3 lines |
| Ver Sync Time | = | 0.124; | // (msec) = 6 lines → PV-PULW |
| // V Back Porch | = | 0.600; | // (msec) = 29 lines |
| // V Top Border | = | 0.000; | // (msec) = 0 lines |

Definition of Terms



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Name _____ Date _____
Name _____ Date _____

Signature: air
Date: 2/20/7/18

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000625

Subject: VGA (640x480) to XGA (1024x768) test vec parameter setup. 17171

$$HSF = \frac{1024}{640} = 1.6 \quad VSF = \frac{768}{480} = 1.6$$

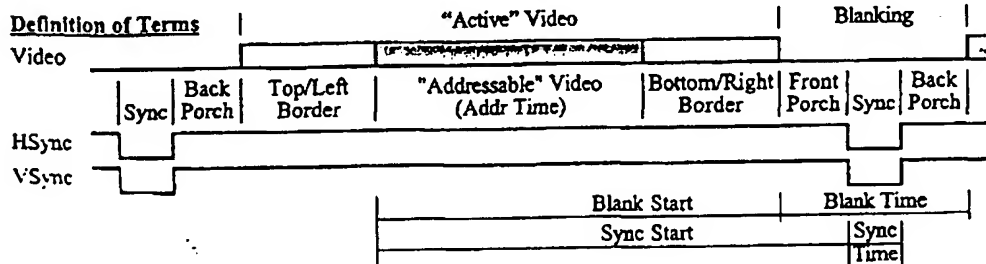
Resolution: 640 x 480 at 60 Hz (non-interlaced)
EDID ID: 031h, 040h
BIOS Modes: 11h, 12h, 101h, 110h, 111h, & 112h (1, 4, 8, 15, 16, & 24 bpp)

Video Display Information Format (VDIF)

PreAdjusted Timing Data

| | | | | |
|--------------------|---|-----------|--------------------------|----------------|
| Timing Name | = 640 x 480 @ 60Hz; | | | |
| Hor Pixels | = 640; | // Pixels | | |
| Ver Pixels | = 480; | // Lines | | |
| Hor Frequency | = 31.469; | // KHz | = 31.8 usec / line | |
| Ver Frequency | = 59.940; | // Hz | = 16.7 msec / frame | |
| Pixel Clock | = 25.175; | // MHz | = 39.7 nsec ± 0.5% | → 39.72 ± 0.5% |
| Character Width | = 8; | // Pixels | = 317.8 nsec | |
| Scan Type | = NONINTERLACED; // H Phase = 2.0 % | | | |
| Hor Sync Polarity | = NEGATIVE; // HBlank = 18.0% of HTotal | | | |
| Ver Sync Polarity | = NEGATIVE; // VBlank = 5.5% of VTTotal | | | |
| Hor Total Time | = 31.778; | // (usec) | = 100 chars = 800 Pixels | → IH-TOTAL |
| Hor Addr Time | = 25.422; | // (usec) | = 80 chars = 640 Pixels | → IH-ADDR |
| Hor Blank Start | = 25.740; | // (usec) | = 81 chars = 648 Pixels | |
| Hor Blank Time | = 5.720; | // (usec) | = 18 chars = 144 Pixels | |
| Hor Sync Start | = 26.058; | // (usec) | = 82 chars = 656 Pixels | |
| // H Right Border | = 0.318; | // (usec) | = 1 chars = 8 Pixels | |
| // H Front Porch | = 0.318; | // (usec) | = 1 chars = 8 Pixels | |
| Hor Sync Time | = 3.813; | // (usec) | = 12 chars = 96 Pixels | → IH-PULLIN |
| // H Back Porch | = 1.589; | // (usec) | = 5 chars = 40 Pixels | → IH-START |
| // H Left Border | = 0.318; | // (usec) | = 1 chars = 8 Pixels | |
| Ver Total Time | = 16.683; | // (msec) | = 525 lines | → IV-TOTAL |
| Ver Addr Time | = 15.253; | // (msec) | = 480 lines | → IV-ADDR |
| Ver Blank Start | = 15.507; | // (msec) | = 488 lines | |
| Ver Blank Time | = 0.922; | // (msec) | = 29 lines | |
| Ver Sync Start | = 15.571; | // (msec) | = 490 lines | |
| // V Bottom Border | = 0.254; | // (msec) | = 8 lines | |
| // V Front Porch | = 0.064; | // (msec) | = 2 lines | |
| Ver Sync Time | = 0.064; | // (msec) | = 2 lines | |
| // V Back Porch | = 0.794; | // (msec) | = 25 lines | |
| // V Top Border | = 0.254; | // (msec) | = 8 lines | |

Definition of Terms



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Name _____ Date _____

Signature: blair
Date: 10/7/8

17172

Subject: _____

$$\text{clk_prd} \cdot \text{IH_TOTAL} \div \text{VSE} = \text{clk_prd} \cdot \text{PH_TOTAL}$$

↑
unknown

$$\text{PH_TOTAL} = \frac{\text{clk_prd}}{\text{clk_prd}} \cdot \text{IH_TOTAL} \div \text{VSE}$$

$$= \frac{39.72}{15.33} \times \frac{800}{1.6} = 1295.5 \approx 1300$$

因 CRT Cathod VESA 規定 $\text{IH_TOTAL} > \text{IH_WIDTH}$

但 LCD monitor 則不受此限 故 IH_TOTAL 可少 以 Timing 表

$$\therefore \text{PH_TOTAL} = 1296$$

$$\text{PH_AWIDTH} = 1024 \times 2$$

$$1296 - 1024 = 272 > \text{PH_ASTART}$$

$$\text{PH_PULW} \rightarrow 108 \text{ 不變}$$

$$\text{PH_ASTART} = 256$$

$$\text{PH_DELAY} = 255$$

$$\text{BH_START} = 256$$

$$\text{BH_END} = 1024 + 256 = 1280$$

$$\text{PV_AWIDTH} = 300 \text{ H} = 768 \text{ D}$$

$$\text{PV_TOTAL} = \frac{\text{clk_prd}}{\text{clk_prd}} \cdot \text{IV_TOTAL} \times \text{VSE} = \frac{39.72}{15.33} \times \frac{525}{1.6}$$

$$= 840$$

$$\text{PV_PULW} = 06$$

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Name

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Signature: blair

Name

Date

Date: 200/7/31

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000627

Subject: _____

17173

$$PV_BACK\ PORCH = 0.F$$

$$PH_EMU = IH_TOTAL / VSF = 800 / 1.6 = 500 = 1F4.H$$

$$IH_EMU = \rightarrow \text{无同} \quad \text{可不改} \quad (\text{以 } PBV_AOFFSET_EVEN \text{ 为 } 300 \text{ 为 } 1F4.H)$$

$$H_{hinc} = \text{floor}(16 / HSF) = 10$$

$$Hd / Hd_x = \frac{16}{1+SF} - H_{hinc} = 0$$

$$\Rightarrow Hd_x = 1 \quad (\text{1个8值})$$

$$Hdy = 0$$

$$V_{hinc} = 10$$

$$Vdx = 1$$

$$Vdy = 0$$

$$AH_{hinc} = \text{floor}(8 \times HSF) = \text{floor}(8 \times 1.6) = \text{floor}(12.8) = 12$$

$$AH_{dy} / AH_{dx} = 8 \times HSF - AH_{hinc} = 0.8 = \frac{8}{10} = \frac{4}{5}$$

$$\Rightarrow AH_{dy} = 4$$

$$AH_{dx} = 5$$

$$\frac{V_{hinc}}{V_{deno}} = VSF = 1.6 = \frac{16}{10} = \frac{8}{5}$$

$$\Rightarrow V_{hinc} = 8$$

$$V_{deno} = 5$$

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| _____ | _____ |
| Name | Date |
| _____ | _____ |
| Name | Date |

Signature: blair
Date: 2000 / 7 / 31

17174

Subject: Brightness Contrast verify

$$R \text{ Contrast} \leftarrow RCAB_CBUS(7 \sim 0) \quad [YUV_RGB_adjust_top/DM_GEN]$$

$$R \text{ Brightness} \leftarrow RCAB_CBUS(15 \sim 8) \quad G.B \# 15$$

$$RCAB_CBUS(7 \sim 0) \leftarrow RCONTRAST_DATA \quad [gc_top/hostif_gc]$$

$$RCAB_CBUS(15 \sim 8) \leftarrow RBRIGHTNESS_DATA$$

When ADDR-IN = RCONTRAST-ADDR \Rightarrow RCONTRAST-EN = 1

● RCONTRAST-ADDR \leftarrow HOST_IBUS(7~0) [DEC-REG, 1-ADDR]

~~DATA-IN~~

HOST_IBUS(7~0) \leftarrow DATA-IN [hostif_gc]

DATA-IN \leftarrow HOST_IBUS(15~8)

ADDR-IN \leftarrow HOST_IBUS(7~0)

HOST_IBUS(15~8) \leftarrow DATA-OUT [IIC(CHIP_CORE)]

● HOST_IBUS(7~1) \leftarrow SUB-ADDR(7~0) [IIC]

| | | | | | |
|------------|----|-----|-----|-----|-------------------|
| CONTRAST | pt | 70 | 7F | 00 | |
| | | 0 | 255 | 128 | ← real |
| | | 128 | 128 | | |
| GC IN | | 128 | 127 | 0 | ← internal signal |
| | | 128 | 128 | | |
| Brightness | -1 | 128 | 127 | 0 | |

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Name _____ Date _____

Signature: blair

Date: 2/2/11

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000629

Subject: _____

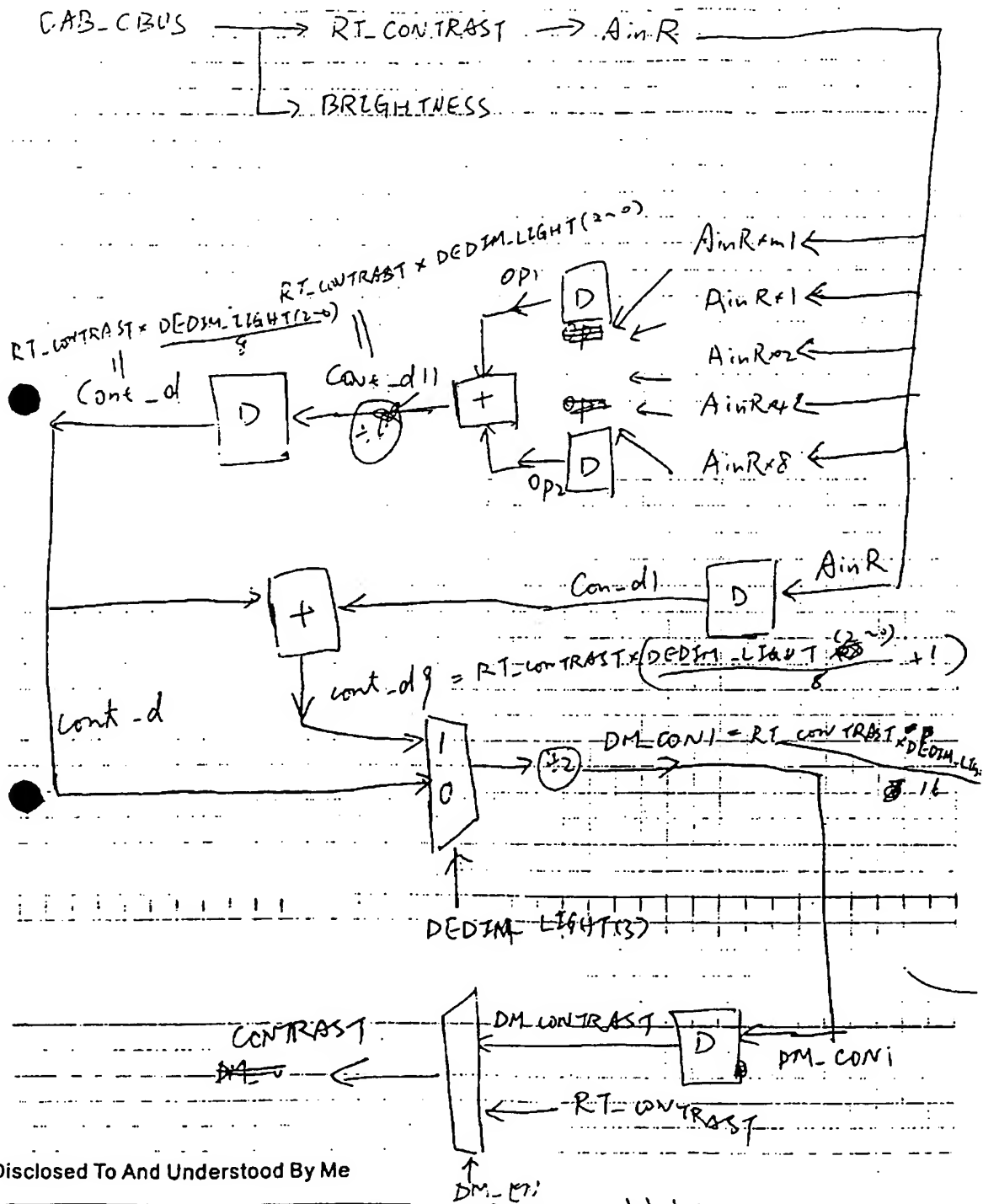
17175

test pattern
normal fms \Rightarrow red \Rightarrow grn \Rightarrow blu \Rightarrow dark (-brt \Rightarrow 0 - con \Rightarrow 0)
 \Rightarrow light (brt \Rightarrow 0, con \Rightarrow 255) \Rightarrow dark (con \Rightarrow 1, brt \Rightarrow 127)
 \Rightarrow light (con \Rightarrow 1, brt \Rightarrow 127) \Rightarrow light red \Rightarrow light grn
 \Rightarrow light blu \Rightarrow light red ok = (grn blu) \Rightarrow grn (brt \Rightarrow 127)
 \Rightarrow light grn \times 2 \Rightarrow light blu \times 2
 \Rightarrow normal \Rightarrow ~~red~~ red overflow
 \Rightarrow grn overflow \Rightarrow blu overflow

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| | | |
|------------|------------|-------------------------|
| Name _____ | Date _____ | Signature: <u>h/air</u> |
| Name _____ | Date _____ | Date: <u>2001/5/1</u> |

Subject: 17176 DM-GEN study



Disclosed To And Understood By Me

Name _____ Date _____

Name _____
Date _____

Signature: bleir

Date: 2000/4/3

Subject: DE-DIM Source code debug

P7177

bright - contrast - adjust 中未把 contrast - delay 考虑

位置 故 boundary color 偏差

按原图先的 delay 修改 发现 waveform 中

~~R contrast~~

YR OK ug vb wrong

dim-act-w

YR_out

UG-VB_out

↑
SCLK
data wrong

↑
data wrong

UG-VB_out to YR-PT-CLK

ug-0

ug-1

gx-cont

PND = PD div 4

=> PND = PD div 4 assign -> gx-cont: (-U x -vshue)

assign 错误

Disclosed To And Understood By Me

Name

Date

Signature: blair

Name

Date

Date: 2011/1/15

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000632

17170
Subject: YUV testing

$$Y_{out} = (Y - Y_{black}) \times R_{contrast} + R_{brightness}$$

$$U_{out} = U \times sat_u_hue + V \times sat_s_hue$$

$$V_{out} = V \times sat_u_hue - U \times sat_s_hue$$

$$Y_{black} \rightarrow \begin{matrix} 0(00) & 127(7F) & -128(80) \end{matrix}$$

$$R_{contrast} \rightarrow \begin{matrix} 1(00) & \frac{255}{128}(7F) & 0(80) \end{matrix}$$

$$R_{brightness} \rightarrow \begin{matrix} 0(00) & 127(7F) & -128(80) \end{matrix}$$

$$sat_u_hue \rightarrow \begin{matrix} 1(00) & 0(00) & \frac{127}{64}(7F) & -2(80) & -1(80) \end{matrix}$$

$$sat_s_hue \rightarrow \begin{matrix} 1(00) & 0(00) & \frac{127}{64}(7F) & -1(80) & -2(80) \end{matrix}$$

$$Y = 0.299R + 0.5876G + 0.114B$$

$$U = Cb = 0.1687R - 0.3214G + 0.58B$$

$$V = Cr = 0.5R - 0.4187G - 0.2813B$$

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Name _____ Date _____

Signature: 298/5/6

Name _____ Date _____

Date: 6/6/11

TRUMPTION CONFIDENTIAL BUSINESS INFORMATION,
SUBJECT TO PROTECTIVE ORDER

TR000633

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 00/00868

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C07D277/36 A01N43/78

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07D A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

19 September 2000

Date of mailing of the international search report

29/09/2000

Name and mailing address of the ISA

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Authorized officer

Allard, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 00/00868

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SEARCH REPORT

Information on patent family members

Application No.

200100382-1

This annex lists the patent family members relating to the patent documents cited in the search report.
The members are as contained in the EPIDOS INPADOC file.
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date | Patent family
member(s) | Publication
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SEARCH REPORT

Information on patent family members

Application No.

200100382-1

This annex lists the patent family members relating to the patent documents cited in the search report.
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| Patent document cited
in search report | Publication
date | Patent family
member(s) | Publication
date |
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| | | EP A1 804431 | 05-11-1997 |
| | | EP A4 804431 | 29-04-1998 |
| | | EP B1 804431 | 24-07-2002 |
| | | FI A0 972951 | 11-07-1997 |
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| | | IL A0 116761 | 14-05-1996 |
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| | | NO A0 973304 | 17-07-1997 |
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| | | NZ A 302013 | 28-01-2000 |
| | | RU C2 2169146 | 20-06-2001 |
| | | TW B 419466 | 21-01-2001 |
| | | WO A1 9622288 | 25-07-1996 |

PATENT COOPERATION TREATY

EO/US
PCT/IB00/00868

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing:

11 January 2001 (11.01.01)

International application No.:

PCT/IB00/00868

Applicant's or agent's file reference:

NIT 364-WO

International filing date:

28 June 2000 (28.06.00)

Priority date:

06 July 1999 (06.07.99)

Applicant:

WATANABE, Yuki Yoshi et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International preliminary Examining Authority on:

01 December 2000 (01.12.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was



was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38



SEARCH REPORT

Application No.
0100382-1

10/030361

A. CLASSIFICATION OF SUBJECT MATTERAccording to the International Patent Classification (IPC⁷):

A61K31/5513

B. FIELDS SEARCHED IPC⁷:

A61K

Electronic data base consulted during the search (name of data base and, where practicable, search terms used)
WPI, CAS**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|---------------------------|
| X | WO 94/22825 A1 (MERCK & CO., INC.) 13 October 1994 (13.10.94)
<i>claim 1.</i>
-- | 2,8,13,
28,29,33 |
| X | WO 95/15963 A1 (BASF AKTIENGESSELLSCHAFT) 15 June 1995
(15.06.95)
<i>claim 1.</i>
-- | 2,8-10,13,28,
29,33-35 |
| X | WO 93/00095 A2 (SMITHKLINE BEECHAM CORPORATION)
7 January 1993 (07.01.93)
<i>claims.</i>
-- | 2,8-10,13,28,
29,33-35 |
| X | WO 93/08174 A1 (GENENTECH, INC.) 29 April 1993 (29.04.93)
<i>claim 1.</i>
-- | 2,8-10,13,28,
29,33-35 |

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the filing date but later than the priority date claimed

"T" later document published after the filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of actual completion of the search: 16 September 2002 (16.09.2002)

AUSTRIAN PATENT OFFICE
Kohlmarkt 8-10, A-1014 VIENNA
Facsimile No. ++431/53424/535

Authorized Officer KRENN M.

Telephone No. ++431/53424/ 435



SEARCH REPORT

Application No.

0100382-1

C (Continuation - Page 2). DOCUMENTS CONSIDERED TO BE RELEVANT

| | | |
|---|--|--------------------------|
| X | EP 0635492 A1 (ELI LILLY AND COMPANY) 25 January 1995 (25.01.95)
<i>claims.</i>
---- | 2,8,9,13,28,
29,33,34 |
|---|--|--------------------------|



Austrian Patent Office

| | |
|--|---|
| Application No.
0100382-1 | Applicant BIOGEN, INC. |
| Filing date
24 July 1997 (24.07.1997) | (Earliest) Priority Date
25 July 1996 (25.07.1996) |

SEARCH REPORT

EXPLANATIONS

WO 94/22825 A1, WO 9515963 A1 and WO 9308174 A1 refer to benzodiazepine-2,5-diones useful for inhibiting the binding of fibrinogen to blood platelets and thereby inhibiting the aggregation of blood platelets.

WO 93/00095 A2 describes bicyclic (6 + 7 membered ring) fibrinogen antagonists, wherein the 7-membered ring might contain up to two heteroatoms chosen from the group of O, S and N.

EP 0635492 A1 concerns bicyclic compounds composed of two fused six membered rings useful as glycoprotein IIb/IIIa antagonists.



☐ EXAMINATION REPORT
☒ WRITTEN OPINION

Application No.
0100382-1

Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

Date of actual completion of the report / opinion: 16 September 2002 (16.09.2002)

1. STATEMENT

| | | | |
|-------------------------------|-----|--------|-----------------------|
| Novelty (N) | YES | Claims | 36,46-49 |
| | NO | Claims | 2,8-10,13,28,29,33-35 |
| Inventive step (IS) | YES | Claims | 36,46-49 |
| | NO | Claims | 2,8-10,13,28,29,33-35 |
| Industrial applicability (IA) | YES | Claims | 2,8-10,13 |
| | NO | Claims | 28,29,33-36,46-49 |

2. CITATIONS AND EXPLANATIONS

Both WO 9422825 A1 and WO 9515963 A1 refer to variously substituted benzodiazepine-2,5-diones.

Provided that in compound IIa of the present application $A_1 = NR^1$ ($R^1 = H$); $X = O$; $R^3 = R^1$ and $R^1 =$ aromatic or non-aromatic ring system; $(CR^1R^2)_m = C_1-C_4$ -alkyl and $W = H$; $R^5 = H$; $R^6 = H$ and "A" = carboxyalkyl substituted aralkyl, claims 2,8,13,28,29,33 are anticipated by WO 9422825 A1.

Provided that in compound IIa of the present application $A_1 = NR^1$; $X = O$; $R^3 = R^1$; $(CR^1R^2)_m = C_1-C_4$ -alkyl; A,B,D and E = methylene and "A" = acyl, aroyl, etc., claims 2, 8-10,13,28,29,33-35 are anticipated by WO 9515963 A1.

WO 9300095 A2 refers to bicyclic fibrinogen antagonists, wherein $D^1-D^4 = -CH_2-$; $R^6 =$ (N-substituted) aminocarbonyl-R; A^1-A^5 form variously substituted seven-membered rings containing up to two heteroatoms chosen from the group O, S and N.

WO 9308174 A1 concerns integrin inhibitors, wherein ring "A" = substituted benzol ($Q^1-L^1 =$ aminocarbonyl); T-U-G = -NCOC- and D = hydrogen.

EP 0635492 A1 discloses glycoprotein IIb/IIIa antagonists showing a bicyclic (= two fused six membered rings, A and B) structure; wherein Q = organic group comprising a basic radical, L = linker (e.g. alkylene) or a bond; $R_3 =$ carboxymethyl and $R_0 = =O$.

In respect of the above cited literature certain compounds disclosed in claims 2, 8-10,13,28,29,33-35 are neither new nor inventive.

Claim 36 describes compounds, wherein A is selected from the group consisting of (N-Ar'-urea)-para-substituted aryl, aralkyl or aralkylcarbonyl. Said compounds are not state of the art; thus claim 36 involves both novelty and inventive step.

As the compounds disclosed in the cited literature are used either as fibrinogen receptor antagonists or as endothelin receptor antagonist and not for treating asthma, MS, diabetes, inflammatory or autoimmune diseases, claims 46-49 show novelty as well as inventive step.

Claims 28,29,33-36 and 46-49 refer to a method of treatment of the human or animal body by therapy, which is not taken to be capable of industrial application (see Singapore Patents Act, Section 16(2)); thus only claims 2,8-10 and 13 are industrially applicable.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



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PCT

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A01N 43/78

(21) International Application Number: PCT/IB00/00868

(22) International Filing Date: 28 June 2000 (28.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/191638 6 July 1999 (06.07.1999) JP

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323-0822 (JP). SHIBUYA, Katsuhiko [JP/JP]; 6-14-4,

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329-0433 (JP). ABE, Takahisa [JP/JP]; 4-1-24,
Miyanomori-2 jo, Chuo-ku, Sapporo-shi, Hokkaido
064-0952 (JP).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
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DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
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KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

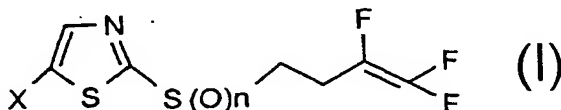
Published:

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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

WO 01/02378 A1

(54) Title: NEMATICIDAL TRIFLUOROBUTENES



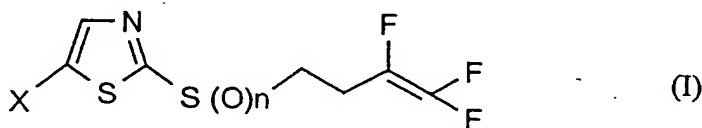
(57) Abstract: The invention relates to compounds of
formula (I) in which X represents halogen, and n repre-
sents 0, 1 or 2, to a process for their preparation and to
their use as nematicides.

NEMATICIDAL TRIFLUOROBUTENES

The present invention relates to novel trifluorobutenes and their use as nematicides.

5 US Patent No. 3,518,172 describes trifluorobutenyl compounds which have nemati-
cidal activity. Japanese Laid-open Patent Publication (PCT) No. 500037/1988 (= WO
86/07590) also describes that some kinds of polyhaloalkene compounds have
nematicidal activity. Further, WO 95/24403 describes that 4,4-difluorobutenyl
10 compounds have nematicidal activity. Japanese Laid-open Patent Application No.
176141/1997 mentions thiazole derivatives having insecticidal and acaricidal
activity.

There have now been found novel trifluorobutenes of the formula (I)

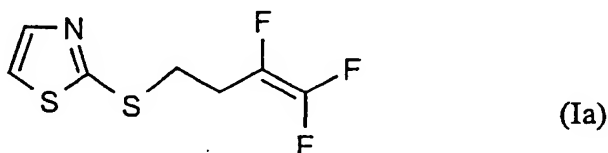


in which

X represents halogen and

20 n represents 0, 1 or 2.

The compounds of the formula (I) in which n represents 0 can be obtained when
trifluorobutenes of the formula (Ia)

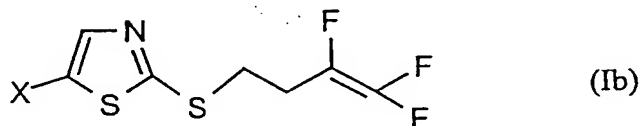


are reacted with a halogenating agent, optionally in the presence of one or more inert diluents (process (A)).

The compounds of the formula (I) in which

n represents 1 or 2

can be obtained when compounds of the formula (Ib)



in which

X is the same as defined above

are reacted with an oxidizing agent, optionally in the presence of one or more inert diluents (process (B)).

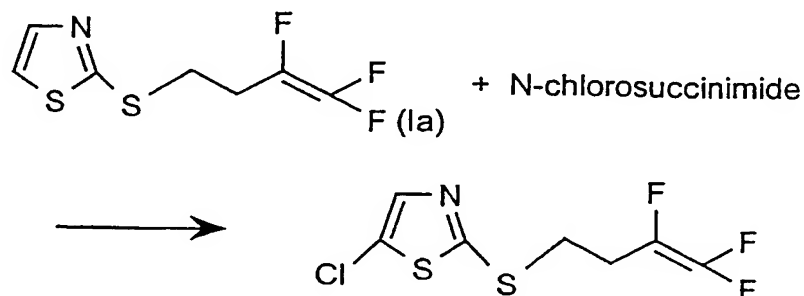
The compounds of the formula (I) of the present invention have strong nematocidal activity and show good compatibility with various crops. According to the present invention the compounds of the formula (I) have surprisingly strong nematocidal activity compared with the known compounds described in the aforementioned literature.

In the present specification X preferably represents fluoro, chloro or bromo. X particularly preferably represents fluoro or chloro. X very particularly preferably represents chloro.

In the present specification n preferably represents 0 or 2. n particularly preferably represents 2.

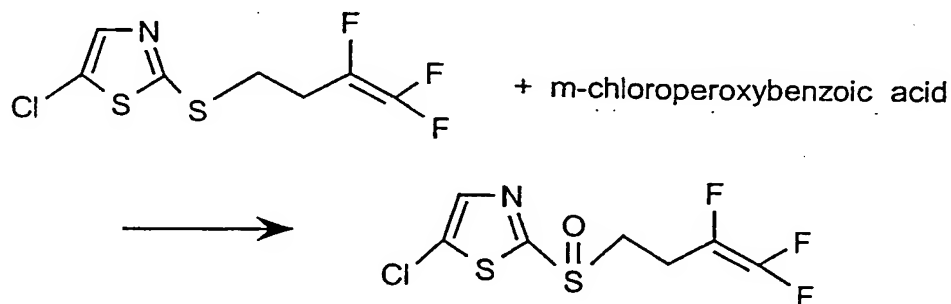
Process (A) for preparing compounds of the formula (I) of the present invention can be represented by the following reaction scheme in which N-chlorosuccinimide is exemplarily used as halogenating agent:

5



Process (B) for preparing compounds of the formula (I) of the present invention can be represented by the following reaction in which 5-chloro-2-(3,4,4-trifluoro-3-butenylthio)thiazole is used as a starting material and m-chloroperoxybenzoic acid is exemplarily used as oxidizing agent.

10



15

2-(3,4,4-trifluoro-3-butenylthio)-thiazole is a known compound described in Japanese Laid-open Patent Publication (PCT) No. 500037/1988 (= WO 86/07590). Compounds of formula (Ib), which are used as starting material in process (B), correspond to the compounds of the formula (I) of the present invention in which n represents 0 and can be synthesized according to the aforementioned process (A).

20

Halogenating agents used in Process (A) can be agents usually used for this purpose in organic chemistry and which are known to a person skilled in the art, including for example sulfonyl chloride, N-chlorosuccinimide, N-bromosuccinimide, trichloroisocyanuric acid, potassium fluoride, sodium chlorate, phosphorus pentachloride, titanium (IV) chloride, chlorine gas, bromine, iodine etc.

Oxidizing agents used for the oxidation of the above-mentioned compounds of the formula (Ib) in process (B) can be agents usually used for this purpose in organic chemistry and which are known to a person skilled in the art including for example hydrogen peroxide water, m-chloroperoxybenzoic acid, peroxyacetic acid, peroxybenzoic acid, magnesium monoperoxyphthalate, potassium peroxymonosulfate, etc.

The reaction of the above-mentioned process (A) is preferably conducted in the presence of an adequate diluent. Diluents which can be used in this process can for example be water; aliphatic, alicyclic and aromatic hydrocarbons (which can be optionally chlorinated) such as hexane, cyclohexane, petroleum ether, ligroine, benzene, methylene chloride, chloroform, carbon tetrachloride, ethylene chloride, chlorobenzene etc.; ethers, such as diethyl ether, methyl ethyl ether, di-isopropyl ether, dibutyl ether, propylene oxide, dioxane, tetrahydrofuran etc.; nitriles, such as acetonitrile, propionitrile, acrylonitrile etc.; acid amides, such as dimethylformamide, dimethylacetamide, N-methylpyrrolidone etc.; sulfones and sulfoxides, such as dimethyl sulfoxide, sulfolane etc.

The reaction temperatures of process (A) according to the invention can be varied over a relatively wide range. In general, temperatures in a range of between 0 and 200°C, preferably between 20 and 150°C are employed. The process (A) according to the invention is generally carried out under normal pressure. However, it is possible to carry out the process (A) under elevated pressure or under reduced pressure, in general between 0.1 bar and 10 bar.

To carry out the process (A) according to the invention, the starting materials are

generally employed in approximately equimolar amounts. However, it is also possible to use one of the components in a relatively large excess. Work-up is carried out according to customary methods (cf. the preparation examples).

5 For example, the compound of the formula (I) in which n represents 0 and X represents chloro can be obtained by reacting 1-1.2 moles of N-chlorosuccinimide with 1 mole of 2-(3,4,4-trifluoro-3-butenylthio)thiazole in carbon tetrachloride under reflux by heating.

10 The reaction of the above-mentioned process (B) is preferably conducted in the presence of an adequate diluent. Diluents which can be used in this process can for example be water; aliphatic, alicyclic and aromatic hydrocarbons (which can be optionally chlorinated), such as hexane, cyclohexane, petroleum, ether, ligroine, benzene, toluene, xylene, methylene chloride, chloroform, carbon tetrachloride, ethylene chloride, chlorobenzene etc.; ethers, such as diethyl ether, methyl ethyl
15 ether, di-isopropyl ether, dibutyl ether, propylene oxide, dioxane, tetrahydrofuran etc.; nitriles, such as acetonitrile, propionitrile, acrylonitrile etc.; alcohols, for example methanol, ethanol, isopropanol, butanol, ethylene glycol etc.; esters, for example ethyl acetate, amyl acetate etc.; acid amides, for example dimethyl-
20 formamide, dimethylacetamide, N-methylpyrrolidone etc.; sulfones and sulfoxides, for example dimethyl sulfoxide, sulfolane etc.; carboxylic acids, for example formic acid, acetic acid etc.

25 The reaction temperatures of process (B) according to the invention can be varied over a relatively wide range: In general, temperatures in a range of between 0 and 150°C, preferably between 0 and 120°C are employed. The process (B) according to the invention is generally carried out under normal pressure. However, it is also possible to carry out the process (B) under elevated pressure or under reduced pressure, in general between 0.1 bar and 10 bar.

30 To carry out the process (B) according to the invention, the starting materials are generally employed in approximately equimolar amounts. However, it is also

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possible to use one of the components in a relatively large excess. Work-up is carried out according to customary methods (cf. the preparation examples).

For example, compounds of the formula (I) in which n represents 1 can be obtained by reacting, 1-2 moles of m-chloroperoxybenzoic acid with 1 mole of the compound of the formula (Ib) in methylene chloride under cooling with ice.

The compounds of the formula (I) according to the present invention show strong controlling activity against nematodes. They can, therefore, be efficiently used as nematicidal agents. The compounds of the formula (I) of the present invention do not exhibit phytotoxicity against crops and can be used for controlling harmful nematodes.

The compounds according to the invention can be used, for example, against nematodes such as *Pratylenchus* spp., *Globodera* spp., such as *Globodera rostochiensis wollenweber*, *Heterodera* spp., such as *Heterodera glycines ichinohe*, *Meloidogyne* spp., *Aphelenchoides* spp., such as *Aphelenchoides basseyi christie*, *Radopholus similis*, *Ditylenchus dipsaci*, *Tylenchulus semipenetrans*, *Longidorus* spp., *Xiphinema* spp., *Trichodorus* spp., *Bursaphelenchus* spp., such as *Bursaphelenchus xylophilis* etc.

The compounds according to the invention are especially useful for combating *Pratylenchus* spp., *Globodera rostochiensis wollenweber*, *Heterodera glycines ichinohe*, *Meloidogyne* spp., *Aphelenchoides basseyi christie*, *Bursaphelenchus xylophilis*.

However, the use of the active compounds according to the invention is in no way restricted to these genera, but also extends in the same manner to other nematodes.

The active compounds can be converted into the customary formulations, such as solutions, emulsions, wettable powders, water dispersible granules, suspensions,

powders, dusting agents, foaming agents, pastes, soluble powders, granules, suspo-emulsion concentrates, microcapsules, fumigants, natural and synthetic materials impregnated with active compound and very fine capsules and polymeric substances.

5 These formulations are prepared in a known manner, for example by mixing the active compounds with extenders, that is liquid solvents, liquefied gas and/or solid diluents or carriers, if appropriate with the use of surface-active agents, that is emulsifiers and/or dispersants and/or foam-formers.

10 If the extender used is water, it is also possible to use, for example, organic solvents as auxiliary solvents. Suitable liquid solvents are essentially: aromatics, such as xylene, toluene, or alkylnaphthalenes, chlorinated aromatics and chlorinated aliphatic hydrocarbons, such as chlorobenzene, chloroethylenes or methylene chloride, aliphatic hydrocarbons, such as cyclohexane or paraffins, for example mineral oil
15 fractions, mineral or vegetable oil, alcohols, such as butanol or glycol, and also their ethers and esters, ketones, such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents, such as dimethylformamide and dimethyl sulphoxide, and also water.

20 Liquefied gas diluents or carriers are liquefied substances which are gases at normal temperature and pressure. Liquefied gas diluents can be, for example, aerosol propellants such as butane, propane, nitrogen gas, carbon dioxide, halogenated hydrocarbons, etc.

25 Suitable solid carriers are:

for example ammonium salts and ground natural minerals, such as kaolins, clays, talc, chalk, quartz, attapulgite, montmorillonite or diatomaceous earth, and ground synthetic minerals, such as finely divided silica, alumina and silicates; suitable solid carriers for granules are: for example crushed and fractionated natural rocks such as
30 calcite, marble, pumice, sepiolite and dolomite, as well as synthetic granules of inorganic and organic meals, and granules of organic material such as sawdust,

coconut shells, maize cobs and tobacco stalks; suitable emulsifiers and/or foam-formers are: for example nonionic and anionic emulsifiers, such as polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonates and protein hydrolysates; suitable dispersants are: for example lignin-sulphite waste liquors and methylcellulose.

Tackifiers such as carboxymethylcellulose and natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, as well as natural phospholipids, such as cephalins and lecithins, and synthetic phospholipids, can be used in the formulations. Other additives can be mineral and vegetable oils.

It is possible to use colorants such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyestuffs, such as alizarin dyestuffs, azo dyestuffs and metal phthalocyanine dyestuffs, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

The formulations in general contain between 0.01 and 95 per cent by weight of active compound, preferably between 0.1 and 90%, particularly preferably between 0.5 and 90%.

The active compounds according to the invention, as such or in their formulations, can also be used in a mixture with known fungicides, bactericides, acaricides, nematocides or insecticides, to widen, for example, the activity spectrum or to prevent the development of resistance. In many cases, this results in synergistic effects, i.e. the activity of the mixture exceeds the activity of the individual components.

Examples of particularly advantageous mixing components are the following:

Fungicides:

aldimorph, ampropylfos, ampropylfos potassium, andoprim, anilazine, azaconazole, azoxystrobin,

5 benalaxyl, benodanil, benomyl, benzamacril, benzamacril-isobutyl, bialaphos, binapacryl, biphenyl, bitertanol, blasticidin-S, bromuconazole, bupirimate, buthiobate,

calcium polysulphide, capsimycin, captafol, captan, carbendazim, carboxin, carvon, quinomethionate, chlobenthiazole, chlorfenazole, chloroneb, chloropicrin, chlorothalonil, chlozolate, clozylacon, cufraneb, cymoxanil, cyproconazole, cyprodinil, cyprofuram,

10 debacarb, dichlorophen, diclobutrazole, diclofluanid, diclomezine, dicloran, diethofencarb, difenoconazole, dimethirimol, dimethomorph, diniconazole, diniconazole-M, dinocap, diphenylamine, dipyrithione, ditalimfos, dithianon, dodemorph, dodine, drazoxolon,

15 ediphenphos, epoxiconazole, etaconazole, ethirimol, etridiazole, famoxadon, fenapanil, fenarimol, fenbuconazole, fenfuram, fenitropan, fempiclonil, fenpropidin, fenpropimorph, fentin acetate, fentin hydroxide, ferbam, ferimzone,

20 fluazinam, flumetover, fluoromide, fluquinconazole, flurprimidol, flusilazole, flusulfamide, flutolanil, flutriafol, folpet, fosetyl-aluminium, fosetyl-sodium, fthalide, fuberidazole, furalaxyl, furametpyr, furcarbonil, furconazole, furconazole-cis, furmecyclox,

guazatine,

hexachlorobenzene, hexaconazole, hymexazole,

25 imazalil, imibenconazole, iminoctadine, iminoctadine albesilate, iminoctadine triacetate, iodocarb, ipconazole, iprobenfos (IBP), iprodione, irumamycin, isoprothiolane, isovaledione,

kasugamycin, kresoxim-methyl, copper preparations, such as: copper hydroxide, copper naphthenate, copper oxychloride, copper sulphate, copper oxide, oxine-copper and Bordeaux mixture,

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mancopper, mancozeb, maneb, meferimzone, mepanipyrim, mepronil, metalaxyl, metconazole, methasulfocarb, methfuroxam, metiram, metomeclam, metsulfovax, mildiomyacin, myclobutanil, myclozolin,

nickel dimethyldithiocarbamate, nitrothal-isopropyl, nuarimol,

5 ofurace, oxadixyl, oxamocarb, oxolinic acid, oxycarboxim, oxyfenthiiin,

paclobutrazole, pefurazoate, penconazole, pencycuron, phosdiphen, pimaricin,

piperalin, polyoxin, polyoxorim, probenazole, prochloraz, procymidone,

propamocarb, propanosine-sodium, propiconazole, propineb, pyrazophos, pyrifenox,

pyrimethanil, pyroquilon, pyroxyfur,

10 quinconazole, quintozone (PCNB),

sulphur and sulphur preparations,

tebuconazole, tecloftalam, tecnazene, tetcyclacis, tetraconazole, thiabendazole,

thicyofen, thifluzamide, thiophanate-methyl, thiram, tioxyimid, tolclofos-methyl,

tolyfluanid, triadimefon, triadimenol, triazbutil, triazoxide, trichlamide, tricyclazole,

15 tridemorph, triflumizole, triforine, triticonazole,

uniconazole,

validamycin A, vinclozolin, viniconazole,

zarilamide, zineb, ziram and also

Dagger G,

20 OK-8705,

OK-8801,

α -(1,1-dimethylethyl)- β -(2-phenoxyethyl)-1H-1,2,4-triazole-1-ethanol,

α -(2,4-dichlorophenyl)- β -fluoro-b-propyl-1H-1,2,4-triazole-1-ethanol,

α -(2,4-dichlorophenyl)- β -methoxy-a-methyl-1H-1,2,4-triazole-1-ethanol,

25 α -(5-methyl-1,3-dioxan-5-yl)- β -[[4-(trifluoromethyl)-phenyl]-methylene]-1H-1,2,4-triazole-1-ethanol,

(5RS,6RS)-6-hydroxy-2,2,7,7-tetramethyl-5-(1H-1,2,4-triazol-1-yl)-3-octanone,

(E)-a-(methoxyimino)-N-methyl-2-phenoxy-phenylacetamide,

isopropyl 1-{2-methyl-1-[[[1-(4-methylphenyl)-ethyl]-amino]-carbonyl]-propyl}-carbamate,

30 1-(2,4-dichlorophenyl)-2-(1H-1,2,4-triazol-1-yl)-ethanone O-(phenylmethyl) oxime,

1-(2-methyl-1-naphthalenyl)-1H-pyrrol-2,5-dione,

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1-(3,5-dichlorophenyl)-3-(2-propenyl)-2,5-pyrrolidinedione,
1-[(diiodomethyl)-sulphonyl]-4-methyl-benzene,
1-[[2-(2,4-dichlorophenyl)-1,3-dioxolan-2-yl]-methyl]-1H-imidazole,
1-[[2-(4-chlorophenyl)-3-phenyloxiranyl]-methyl]-1H-1,2,4-triazole,
5 1-[1-[2-[(2,4-dichlorophenyl)-methoxy]-phenyl]-ethenyl]-1H-imidazole,
1-methyl-5-nonyl-2-(phenylmethyl)-3-pyrrolidinole,
2',6'-dibromo-2-methyl-4'-trifluoromethoxy-4'-trifluoro-methyl-1,3-thiazole-5-
carboxanilide,
2,2-dichloro-N-[1-(4-chlorophenyl)-ethyl]-1-ethyl-3-methyl-cyclopropane-
10 carboxamide,
2,6-dichloro-5-(methylthio)-4-pyrimidinyl thiocyanate,
2,6-dichloro-N-(4-trifluoromethylbenzyl)-benzamide,
2,6-dichloro-N-[[4-(trifluoromethyl)-phenyl]-methyl]-benzamide,
2-(2,3,3-triiodo-2-propenyl)-2H-tetrazole,
15 2-[(1-methylethyl)-sulphonyl]-5-(trichloromethyl)-1,3,4-thiadiazole,
2-[[6-deoxy-4-O-(4-O-methyl- β -D-glycopyranosyl)- α -D-glucopyranosyl]-amino]-4-
methoxy-1H-pyrrolo[2,3-d]pyrimidine-5-carbonitrile,
2-aminobutane,
2-bromo-2-(bromomethyl)-pentanedinitrile,
20 2-chloro-N-(2,3-dihydro-1,1,3-trimethyl-1H-inden-4-yl)-3-pyridinecarboxamide,
2-chloro-N-(2,6-dimethylphenyl)-N-(isothiocyanatomethyl)-acetamide,
2-phenylphenol (OPP),
3,4-dichloro-1-[4-(difluoromethoxy)-phenyl]-1H-pyrrol-2,5-dione,
3,5-dichloro-N-[cyano-[(1-methyl-2-propynyl)-oxy]-methyl]-benzamide,
25 3-(1,1-dimethylpropyl-1-oxo-1H-indene-2-carbonitrile),
3-[2-(4-chlorophenyl)-5-ethoxy-3-isoxazolidinyl]-pyridine,
4-chloro-2-cyano-N,N-dimethyl-5-(4-methylphenyl)-1H-imidazole-1-sulphonamide,
4-methyl-tetrazolo[1,5-a]quinazolin-5(4H)-one,
8-(1,1-dimethylethyl)-N-ethyl-N-propyl-1,4-dioxaspiro[4.5]decane-2-methanamine,
30 8-hydroxyquinoline sulphate,
9H-xanthene-2-[(phenylamino)-carbonyl]-9-carboxylic hydrazide,

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bis-(1-methylethyl) 3-methyl-4-[(3-methylbenzoyl)-oxy]-2,5-thiophenedicarboxylate,
cis-1-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-yl)-cycloheptanol,
cis-4-[3-[4-(1,1-dimethylpropyl)-phenyl-2-methylpropyl]-2,6-dimethyl-morpholine
hydrochloride,

- 5 ethyl [(4-chlorophenyl)-azo]-cyanoacetate,
potassium hydrogen carbonate,
methanetetraethiol sodium salt,
methyl 1-(2,3-dihydro-2,2-dimethyl-1H-inden-1-yl)-1H-imidazole-5-carboxylate,
methyl N-(2,6-dimethylphenyl)-N-(5-isoxazolylcarbonyl)-DL-alaninate,
10 methyl N-(chloroacetyl)-N-(2,6-dimethylphenyl)-DL-alaninate,
N-(2,3-dichloro-4-hydroxyphenyl)-1-methyl-cyclohexanecarboxamide,
N-(2,6-dimethylphenyl)-2-methoxy-N-(tetrahydro-2-oxo-3-furanyl)-acetamide,
N-(2,6-dimethylphenyl)-2-methoxy-N-(tetrahydro-2-oxo-3-thienyl)-acetamide,
N-(2-chloro-4-nitrophenyl)-4-methyl-3-nitro-benzenesulphonamide,
15 N-(4-cyclohexylphenyl)-1,4,5,6-tetrahydro-2-pyrimidineamine,
N-(4-hexylphenyl)-1,4,5,6-tetrahydro-2-pyrimidineamine,
N-(5-chloro-2-methylphenyl)-2-methoxy-N-(2-oxo-3-oxazolidinyl)-acetamide,
N-(6-methoxy)-3-pyridinyl)-cyclopropanecarboxamide,
N-[2,2,2-trichloro-1-[(chloroacetyl)-amino]-ethyl]-benzamide,
20 N-[3-chloro-4,5-bis(2-propinyloxy)-phenyl]-N'-methoxy-methanimidamide,
N-formyl-N-hydroxy-DL-alanine-sodium salt,
O,O-diethyl [2-(dipropylamino)-2-oxoethyl]-ethylphosphoramidothioate,
O-methyl S-phenyl phenylpropylphosphoramidothioate,
S-methyl 1,2,3-benzothiadiaazole-7-carbothioate, and
25 spiro[2H]-1-benzopyran-2,1'(3'H)-isobenzofuran]-3'-one,

Bactericides:

- bronopol, dichlorophen, nitrapyrin, nickel dimethyldithiocarbamate, kasugamycin,
octhilinone, furancarboxylic acid, oxytetracyclin, probenazole, streptomycin,
30 tecloftalam, copper sulphate and other copper preparations.

Insecticides / acaricide / nematocides:

- abamectin, acephate, acetamiprid, acrinathrin, alanycarb, aldicarb, aldoxycarb, alpha-cypermethrin, alphamethrin, amitraz, avermectin, AZ 60541, azadirachtin, azamethiphos, azinphos A, azinphos M, azocyclotin,
- 5 Bacillus popilliae, Bacillus sphaericus, Bacillus subtilis, Bacillus thuringiensis, baculoviruses, Beauveria bassiana, Beauveria tenella, bendiocarb, benfuracarb, bensultap, benzoximate, betacyfluthrin, bifenazate, bifenthrin, bioethanomethrin, biopermethrin, BPMC, bromophos A, bufencarb, buprofezin, butathiofos, butocarboxim, butylpyridaben,
- 10 cadusafos, carbaryl, carbofuran, carbophenothion, carbosulfan, cartap, chloethocarb, chlorethoxyfos, chlorfenapyr, chlorfenvinphos, chlorfluazuron, chlormephos, chlorpyrifos, chlorpyrifos M, chlovaporthrin, cis-resmethrin, cispermethrin, clocythrin, cloethocarb, clofentezine, cyanophos, cycloprene, cycloprothrin, cyfluthrin, cyhalothrin, cyhexatin, cypermethrin, cyromazine,
- 15 deltamethrin, demeton M, demeton S, demeton-S-methyl, diafenthiuron, diazinon, dichlorvos, diflubenzuron, dimethoat, dimethylvinphos, diofenolan, disulfoton, docusat-sodium, dofenapyn,
- eflusilanate, emamectin, empenthrin, endosulfan, Entomopftora spp., esfenvalerate, ethiofencarb, ethion, ethoprophos, etofenprox, etoxazole, etrimfos,
- 20 fenamiphos, fenazaquin, fenbutatin oxide, fenitrothion, fenothiocarb, fenoxacrim, fenoxycarb, fenpropathrin, fenpyrad, fenpyrithrin, fenpyroximate, fenvalerate, fipronil, fluazinam, fluazuron, flubrocycythrinate, flucycloxuron, flucythrinate, flufenoxuron, flutenzine, fluvalinate, fonophos, fosmethilan, fosthiazate, fubfenprox, furathiocarb,
- 25 granulosis viruses,
- halofenozide, HCH, heptenophos, hexaflumuron, hexythiazox, hydroprene, imidacloprid, isazofos, isofenphos, isoxathion, ivermectin, nuclear polyhedrosis viruses, lambda-cyhalothrin, lufenuron

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- malathion, mecarbam, metaldehyde, methamidophos, Metharhizium anisopliae, Metharhizium flavoviride, methidathion, methiocarb, methomyl, methoxyfenozide, metolcarb, metoxadiazone, mevinphos, milbemectin, monocrotophos, naled, nitenpyram, nithiazine, novaluron,
- 5 omethoat, oxamyl, oxydemethon M, Paecilomyces fumosoroseus, parathion A, parathion M, permethrin, phenthoat, phorat, phosalone, phosmet, phosphamidon, phoxim, pirimicarb, pirimiphos A, pirimiphos M, profenofos, promecarb, propoxur, prothiofos, prothoat, pymetrozine, pyraclofos, pyresmethrin, pyrethrum, pyridaben, pyridathion, pyrimidifen,
- 10 pyriproxyfen, quinalphos, ribavirin, salithion, sebufos, silafluofen, spinosad, sulfotep, sulprofos, tau-fluvalinate, tebufenozide, tebufenpyrad, tebupirimiphos, teflubenzuron,
- 15 tefluthrin, temephos, temivinphos, terbufos, tetrachlorvinphos, theta-cypermethrin, thiamethoxam, thiapronil, thiatriphos, thiocyclam hydrogen oxalate, thiodicarb, thiofanox, thuringiensin, traloccythrin, tralomethrin, triarathene, triazamate, triazophos, triazuron, trichlophenidine, trichlorfon, triflumuron, trimethacarb, vamidothion, vaniliprole, Verticillium lecanii,
- 20 YI 5302, zeta-cypermethrin, zolaprofos, (1R-cis)-[5-(phenylmethyl)-3-furanyl]-methyl 3-[(dihydro-2-oxo-3(2H)-furanylidene)-methyl]-2,2-dimethylcyclopropanecarboxylate, (3-phenoxyphenyl)-methyl 2,2,3,3-tetramethylcyclopropanecarboxylate,
- 25 1-[(2-chloro-5-thiazolyl)methyl]tetrahydro-3,5-dimethyl-N-nitro-1,3,5-triazine-2(1H)-imine, 2-(2-chloro-6-fluorophenyl)-4-[4-(1,1-dimethylethyl)phenyl]-4,5-dihydro-oxazole, 2-(acetyloxy)-3-dodecyl-1,4-naphthalenedione, 2-chloro-N-[[[4-(1-phenylethoxy)-phenyl]-amino]-carbonyl]-benzamide,
- 30 2-chloro-N-[[[4-(2,2-dichloro-1,1-difluoroethoxy)-phenyl]-amino]-carbonyl]-benzamide,

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3-methylphenyl propylcarbamate.

4-[4-(4-ethoxyphenyl)-4-methylpentyl]-1-fluoro-2-phenoxy-benzene,

4-chloro-2-(1,1-dimethylethyl)-5-[[2-(2,6-dimethyl-4-phenoxyphenoxy)ethyl]thio]-
3(2H)-pyridazinone,

5 4-chloro-2-(2-chloro-2-methylpropyl)-5-[(6-iodo-3-pyridinyl)methoxy]-3(2H)-
pyridazinone,

4-chloro-5-[(6-chloro-3-pyridinyl)methoxy]-2-(3,4-dichlorophenyl)-3(2H)-
pyridazinone,

Bacillus thuringiensis strain EG-2348,

10 [2-benzoyl-1-(1,1-dimethylethyl)-hydrazinobenzoic acid,
2,2-dimethyl-3-(2,4-dichlorophenyl)-2-oxo-1-oxaspiro[4.5]dec-3-en-4-yl butanoate,
[3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene]-cyanamide,
dihydro-2-(nitromethylene)-2H-1,3-thiazine-3(4H)-carboxaldehyde,

ethyl [2-[[1,6-dihydro-6-oxo-1-(phenylmethyl)-4-pyridazinyl]oxy]ethyl]-carbamate,
15 N-(3,4,4-trifluoro-1-oxo-3-butenyl)-glycine,

N-(4-chlorophenyl)-3-[4-(difluoromethoxy)phenyl]-4,5-dihydro-4-phenyl-1H-
pyrazole-1-carboxamide,

N-[(2-chloro-5-thiazolyl)methyl]-N'-methyl-N''-nitro-guanidine,

N-methyl-N'-(1-methyl-2-propenyl)-1,2-hydrazinedicarbothioamide,

20 N-methyl-N'-2-propenyl-1,2-hydrazinedicarbothioamide,

O,O-diethyl [2-(dipropylamino)-2-oxoethyl]-ethylphosphoroamidothioate.

A mixture with other known active compounds, such as herbicides, or with fertilizers
and growth regulators is also possible.

25

Furthermore, when used as nematicides, the active compounds according to the
invention can be present in their commercial formulations and in the use forms,
prepared from these formulations, as a mixture with synergists. Synergists are
compounds which increase the action of the active compounds, without it being
30 necessary for the synergist added to be active itself.

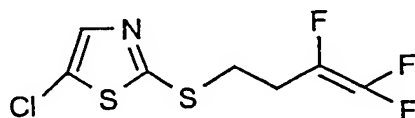
The active-compound content of the use forms prepared from the commercial formulations can vary within wide limits. The active-compound concentration of the use forms can be from 0.0000001 to 95% by weight of active compound, preferably between 0.0001 and 1% by weight.

5 Application is carried out in a customary manner adapted to the use forms.

The preparation and the use of the compounds according to the present invention will be described more specifically by the following examples. However, the present invention should not be restricted to them in any way. "Parts" mean "parts by weight" unless specified otherwise.

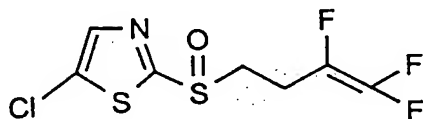
Preparation Examples

Example 1



20 2-(3,4,4-Trifluoro-3-butenylthio)thiazole (6.75 g, 30 mM) is dissolved in carbon tetrachloride (60 ml). N-chlorosuccinimide (4.8 g) is added to the solution and refluxed for 18 hours by heating. As soon as the reaction has reached room temperature, the mixture is filtered and the solvent is distilled off. The concentrate is purified by column chromatography (eluent: hexane/ethyl acetate = 90/10) to obtain 5-chloro-2-(3,4,4-trifluoro-3-butenylthio)thiazole as pale yellow liquid (n_D^{20} 1.5326).

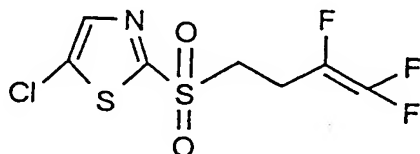
Example 2



5 5-Chloro-2-(3,4,4-trifluoro-3-butenylthio)thiazole (2.07 g, 8 mM) is dissolved in chloroform (40 ml). m-chloroperoxybenzoic acid (1.38 g) is added to the solution under ice cooling (temperature below 4°C) and further stirred for 8 hours at a temperature below 4°C.

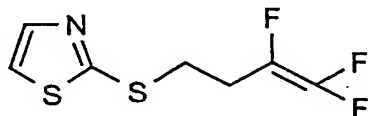
10 10% sodium thiosulfate is added to the solution and the solution is then fractionated. The chloroform layer is washed with 5% aqueous solution of sodium hydroxide and dried over unhydrous magnesium sulfate. The solvent is distilled off and the concentrate is purified by column chromatography (eluent: hexane/ethyl acetate = 90/10) to obtain 5-chloro-2-(3,4,4-trifluoro-3-butenylsulfinyl)thiazole (1.5 g) as pale yellow liquid (n_D^{20} 1.5380).

15 Example 3



20 To the solution of 5-chloro-2-(3,4,4-trifluoro-3-butenylthio)thiazole (2.60 g, 10 mM) and acetic acid (28 g) 31% hydrogen peroxide water (3.29 g) is added and stirred at 55-60°C for 6 hours. After cooling to 5°C the reaction mixture is adjusted to pH 6 by adding an appropriate amount of an aqueous solution of sodium hydroxide, diluted with water and extracted three times with chloroform (25 ml). The chloroform layer is washed with water, 10% sodium thiosulfate and water in this order, and dried over unhydrous sodium sulfate. The solvent is distilled off and the concentrate is purified by column chromatography (eluent: hexane/ethyl acetate = 90/10) to obtain 5-chloro-2-(3,4,4-trifluoro-3-butenylsulfonyl)thiazole (2.2 g) as pale yellow liquid (n_D^{20} 1.5205).

Reference Example



5 2-Mercaptothiazole (5.18 g), potassium carbonate (6.72 g) and 4-bromo-1,1,2-trifluorobutene-1 (9.21 g) are refluxed in acetonitrile (60 ml) in the presence of argon gas for 6 hours by heating. After the reaction mixture has reached room temperature, it is filtered and the solvent is distilled off. The residue is dissolved in dichloromethane and washed with 5% aqueous solution of sodium hydroxide and water in this order. It is dried over anhydrous sodium sulfate and purified by column chromatography (eluent: dichloromethane) to obtain 2-(3,4,4-trifluoro-3-butenylthio)thiazole (8.6 g) as pale yellow liquid (n_D^{20} 1.5200).

Use Examples

Example 1 Test against Meloidogyne spp. (Soil pot test)

Preparation of test agent:

1 Part of the active compound is impregnated to 99 parts of pumice to obtain fine granules.

Test method:

The test agent prepared as mentioned above was added to soil contaminated with Meloidogyne incognita to a chemical concentration of 10 ppm and homogeneously mixed by stirring. A pot (1/5000 are) was filled with the soil. About 20 seeds of tomato (variety: Kurihara) were sown per pot. After cultivation in a greenhouse for 4 weeks, they were carefully pulled out not to damage the roots and the root knot index and the controlling effect were determined as follows.

- Degree of damage
- 0: No knots were formed (Complete control).
 - 1: A few knots were formed.
 - 2: Knots were formed to a medium extent.
 - 3: Knots were formed to an intense extent.
 - 4: Knots were formed to the most intense extent (which corresponds to non-treatment).

$$\text{Root knot index} = \frac{\sum (\text{degree of damage} \times \text{number of individuals})}{\text{Total number of tested individuals} \times 4} \times 100$$

The controlling effect of the compounds tested can then be evaluated according to the following equation:

$$\text{Controlling effect [\%]} = \frac{(\text{Root knot index at non-treated area} - \text{Root knot index at treated area})}{\text{Root knot index at non-treated area}} \times 100$$

The evaluation of the controlling effects of the compounds according to the present invention was done on the basis of the values of the controlling effect which can be obtained in the above-mentioned way and were connected with the following standards:

- a: Controlling effect 100-71%
- b: Controlling effect 70-50%
- c: Controlling effect less than 50%
- d: Controlling effect 0%

Results are shown in the following Table 1.

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Table 1

| Compound
Ex. No. | Concentration of active ingredient
[ppm] | Evaluation of controlling
effect |
|---------------------|---|-------------------------------------|
| 1 | 10 | a |
| 2 | 10 | a |
| 3 | 10 | a |

Formulation Examples

5

Example 1 (Granule)

10

To a mixture of 10 parts of a compound according to the present invention (Example No. 1), 30 parts of bentonite (montmorillonite), 58 parts of talc and 2 parts of ligninsulphonate salt, 25 parts water are added, well kneaded, worked up into granules of 10-40 mesh with the help of an extrusion granulator and dried at 40-50°C to obtain granules.

15

Example 2 (Granule)

20

95 Parts of clay mineral particles having a particle diameter distribution of 0.2-2 mm are put into a rotary mixer. While rotating it, 5 parts of a compound according to the present invention (Example No. 2) are sprayed onto the mineral particles together with a liquid diluent to obtain uniformly wetted particles and the particles are then dried at 40-50°C to obtain granules.

25

Example 3 (Emulsifiable concentrates)

30 Parts of a compound according to the present invention (Example No. 3), 55 parts of xylene, 8 parts of polyoxyethylene alkyl phenyl ether and 7 parts of calcium alkylbenzenesulphonate are mixed and stirred to obtain an emulsion.

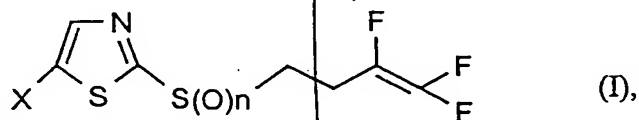
Example 4 (Wettable powder)

5 15 parts of a compound according to the present invention (Example No. 1), 80 parts of a mixture of white carbon (hydrous amorphous silicon oxide fine powders) and powder clay (1:5), 2 parts of sodium alkylbenzenesulphonate and 3 parts of sodium alkyl naphthalenesulphonate-formalin-condensate are crushed and mixed together to obtain a wettable powder.

2050E0 T9E0E00T

Claims

Compounds of the formula (I)



wherein

X represents halogen, and

n represents 0, 1 or 2.

2. Compounds of the formula (I) according to claim 1, wherein

X represents fluoro, chloro or bromo, and

n represents 0 or 2.

3. Compounds of the formula (I) according to claim 1 or claim 2, wherein

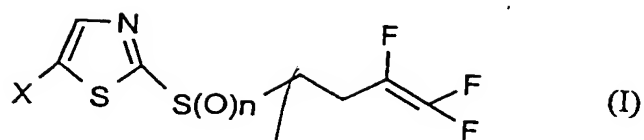
X represents chloro or bromo, and

n represents 2.

4. Compounds of the formula (I) according to claims 1 to 3, wherein

X represents chloro.

5. Process for preparing compounds of the formula (I)



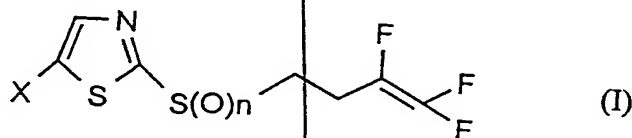
wherein

X is as defined in claims 1 to 4, and

n represents 0,

characterized in that 2-(3,4,4-trifluoro-3-butenylthio)thiazole is reacted with a halogenating agent, if appropriate in the presence of inert solvents.

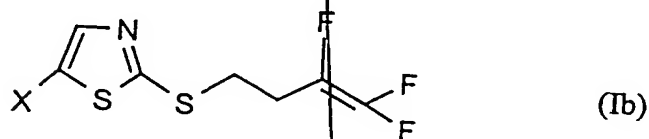
6. Process for preparing compounds of the formula (I)



wherein

n represents 1 or 2, and

X is as defined in claims 1 to 4, characterized in that compounds of the formula (Ib)



wherein

X is as defined in claims 1 to 4.

are reacted with an oxidizing agent, if appropriate in the presence of inert

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solvents.

7. Nematicidal compositions, characterized in that they contain at least one compound of the formula (I) according to claims 1 to 4.

8. A method of combating nematodes, characterized in that compounds of the formula (I) according to claims 1 to 4 are allowed to act on nematodes and/or their habitat.

9. Use of the compounds of the formula (I) according to claims 1 to 4 for combating nematodes.

10. Process for preparing nematicidal compositions, characterized in that the compounds of the formula (I) according to claims 1 to 4 are mixed with extenders and/or surface active agents.

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15

PATENT COOPERATION TREATY

PCT

REC'D 11 SEP 2001

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| | | | |
|--|--|--|---|
| Applicant's or agent's file reference
NIT 364-WO Lu | FOR FURTHER ACTION | | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
| International application No.
PCT/IB00/00868 | International filing date (day/month/year)
28/06/2000 | Priority date (day/month/year)
06/07/1999 | |
| International Patent Classification (IPC) or national classification and IPC
C07D277/36 | | | |
| Applicant
NIHON BAYER AGROCHEM K.K. et al. | | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.


3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| | |
|---|--|
| Date of submission of the demand

01/12/2000 | Date of completion of this report

24.09.2001 |
| Name and mailing address of the international preliminary examining authority:

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Fax: +49 89 2399 - 4465 | Authorized officer

Usuelli, A

Telephone No. +49 89 2399 7366 |



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB00/00868

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-21 as originally filed

Claims, No.:

1-10 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB00/00868

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | |
|-------------------------------|------------------|
| Novelty (N) | Yes: Claims 1-10 |
| | No: Claims |
| Inventive step (IS) | Yes: Claims |
| | No: Claims 1-10 |
| Industrial applicability (IA) | Yes: Claims 1-10 |
| | No: Claims |

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1- In the present Written Opinion reference is made to the following documents:

d1: WO-A-8607590

d2: WO-A-9524403

2- Novelty

D1 discloses a broad class of trifluorobutenyl derivatives which encompasses also the compounds of the invention when R (in d1) is an "optionally substituted thiazoliny". However there are neither specific examples nor subclasses of preferred compounds in which said group R represent a 5-halogen-thiazoliny. The present compounds of formula (I) are therefore taken as a novel selection over the compounds of d1.

The compounds of the invention are novel vis-à-vis d2 on account of the fluorine atom on the second carbon atom of the butenyl moiety.

Accordingly, claims 1-10 fulfil the requirements of Art. 33(2) PCT.

3- Inventive step

3.1- Both d1 and d2 disclose compounds useful for combatting infestations of nematodes. The compound of example 16 of d1 (page 22) differs from the compounds of the invention (cf. in particular compound of example 1) only in that the hydrogen in position 5 of the thiazole ring has been replaced by a halogen. The closest compounds of d2 are the compounds VII.24-VII.26 (page 16) which differ from the compounds of the invention (cf. in particular the compounds of examples 1-3) only in that they have a hydrogen atom on the C-2 of the butenyl moiety instead of a fluorine. This means that, starting from the closest prior art, the technical problem of providing further nematicides has been solved by introducing in the known compounds a halogen in replacement of a hydrogen. It appears that the skilled man would not be surprised that this minimal modification of the prior art compounds would allow to obtain further compounds useful as nematicides. This is indirectly demonstrated by the fact that those compounds of d1 and d2 which differ from each other only in that a halogen replaces a hydrogen (cf. for instance the compound of example 16 of d1 with the compound VII.1 of d2), have the same activity.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IB00/00868

3.2- Accordingly, an inventive step could be acknowledged only if it is shown by means of comparative tests that the compounds of the invention have unexpected effects vis-à-vis the compounds of d1 and d2. In order to have significant results, the compounds compared should have the maximum degree of similarity (for instance the compound 16 of d1 must be compared with the compound of the example 1 of the present application).

3.3- In view of the above paragraphs claims 1-10 do not fulfil the requirements of Art. 33(3) PCT.

Re Item VII

Certain defects in the international application

1- The units of pressure "bar" employed on pages 4 line 29 and 5 line 29, are not additionally expressed in terms of the units stipulated by Rule 10.1/(a)/and/(b) PCT.

2- The sentences "However...in any way" (page 16, lines 8-9) is considered irrelevant and thus superfluous, cf. Rule 9.1 (iv) PCT.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|--|--|--|
| Applicant's or agent's file reference
NIT 364-W0 | FOR FURTHER ACTION <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small> | |
| International application No.
PCT/IB 00/ 00868 | International filing date (day/month/year)
28/06/2000 | (Earliest) Priority Date (day/month/year)
06/07/1999 |
| Applicant

NIHON BAYER AGROCHEM K.K. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 00/00868

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C07D277/36 A01N43/78

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07D A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| Y | WO 86 07590 A (FMC CORPORATION)
31 December 1986 (1986-12-31)
cited in the application
the whole document, particularly example
16
--- | 1-10 |
| Y | WO 95 24403 A (ZENECA LIMITED)
14 September 1995 (1995-09-14)
cited in the application
the whole document, particularly pages
15-19, table VII, and examples
VII.1-VII.16
----- | 1-10 |

☐

Further documents are listed in the continuation of box C.

☒

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

19 September 2000

Date of mailing of the international search report

29/09/2000

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Authorized officer

Allard, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 00/00868

| Patent document
cited in search report | Publication
date | Patent family
member(s) | Publication
date |
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